

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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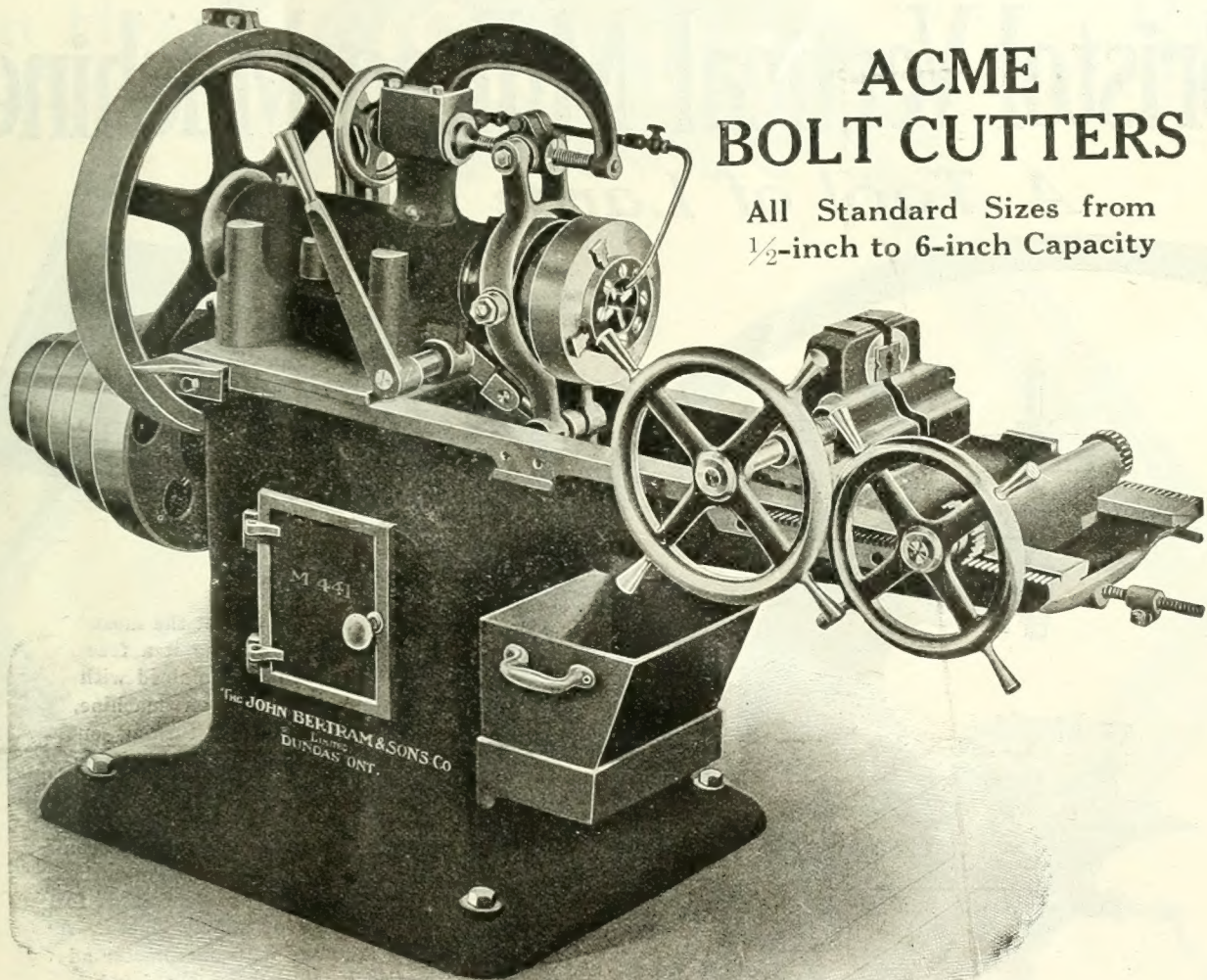
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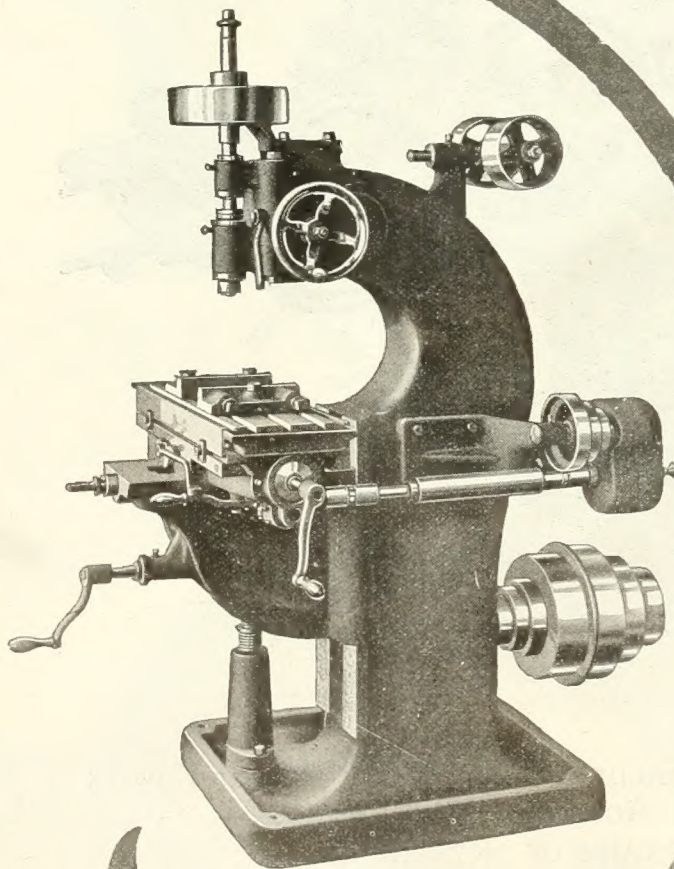




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A Tool of Large Capacity



Ball Bearings are used at the most important points making it a free running tool, which, combined with its being a belt-driven machine, makes it capable of turning out work on which an extra smooth finish is desired.

The longitudinal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

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Write for bulletin giving fullest particulars.

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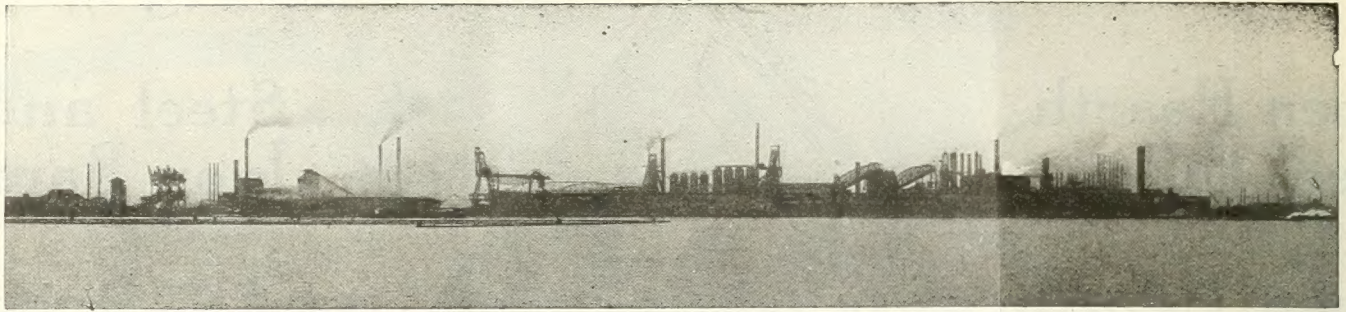
Wrought
Pipe

Pole Line
Hardware

Screws & Nails

Bolts Nuts & Washers

Wire & Wire Products



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

ANNOUNCEMENT



THE ALGOMA STEEL CORPORATION, LIMITED, take pleasure in announcing to their customers and the Canadian trade that in accordance with the widespread desire throughout the Dominion that there should be obtained in Canada with Canadian labor, a much larger proportion of the requirements of this country in STEEL SECTIONS for STRUCTURAL PURPOSES, CAR CONSTRUCTION, SHIPBUILDERS' REQUIREMENTS, etc., they are just completing extensive alterations and additions to their rolling mills, and on or about 1ST NOVEMBER, will be ready to produce and ship American Standard Sections of BEAMS and CHANNELS up to and including 15", all standard sections of ANGLES from 6" x 6" down to 1 1/4" x 1 1/4", ZEE BARS for car builders and general purposes, small and large ROUNDS and SQUARES, and FLAT BARS up to 14" wide. The quality of the product is already well known to the trade, and is exclusively steel made by the Open Hearth process, and can be furnished in all grades from the softest rivet stock to high carbon special spring material.

The following are the sections which will be rolled:---

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6 x 6"—5 x 5"—4 x 4"
 3 1/2 x 3 1/2"—3 x 3"
 2 1/2 x 2 1/2"—2 1/4 x 2 1/4"
 2 x 2"—1 3/4 x 1 3/4"
 1 1/2 x 1 1/2"—1 1/4 x 1 1/4"

ANGLES—Unequal Leg—

6 x 4"—6 x 3 1/2"—5 x 4"
 5 x 3 1/2"—5 x 3"—4 1/2 x 3"
 4 x 3 1/2"—4 x 3"—3 1/2 x 3"
 3 1/2 x 2 1/2"—3 x 2 1/2"—3 x 2"
 2 1/2 x 2"

BEAMS—

15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—

15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEEs—

3 1/4 x 5 x 3 1/4 x 5/16
 3 5/16 x 5 1/16 x 3 5/16 x 3/8"
 3 3/8 x 5 1/8 x 3 3/8 x 7/16"
 3 1/16 x 4 x 3 1/16 x 1/4"

3 1/8 x 4 1/16 x 3 1/8 x 5/16"

3 3/16 x 4 1/8 x 3 3/16 x 3/8"

2 11/16 x 3 x 2 11/16 x 1/4"

2 3/4 x 3 1/16 x 2 3/4 x 5/16"

ROUNDS—

All sizes from 1/2" up to and including 4".

SQUARES—

All sizes from 1/2" up to and including 3".

FLATS—

All sizes from 1 x 1/4" up to and including 14" wide.

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All sections from 12 lbs. up to and including 45 lbs. per yard.

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Machine cast FOUNDRY MALLEABLE and BASIC.

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The "WILT" has stood the test of all conditions—it is here to stay—its
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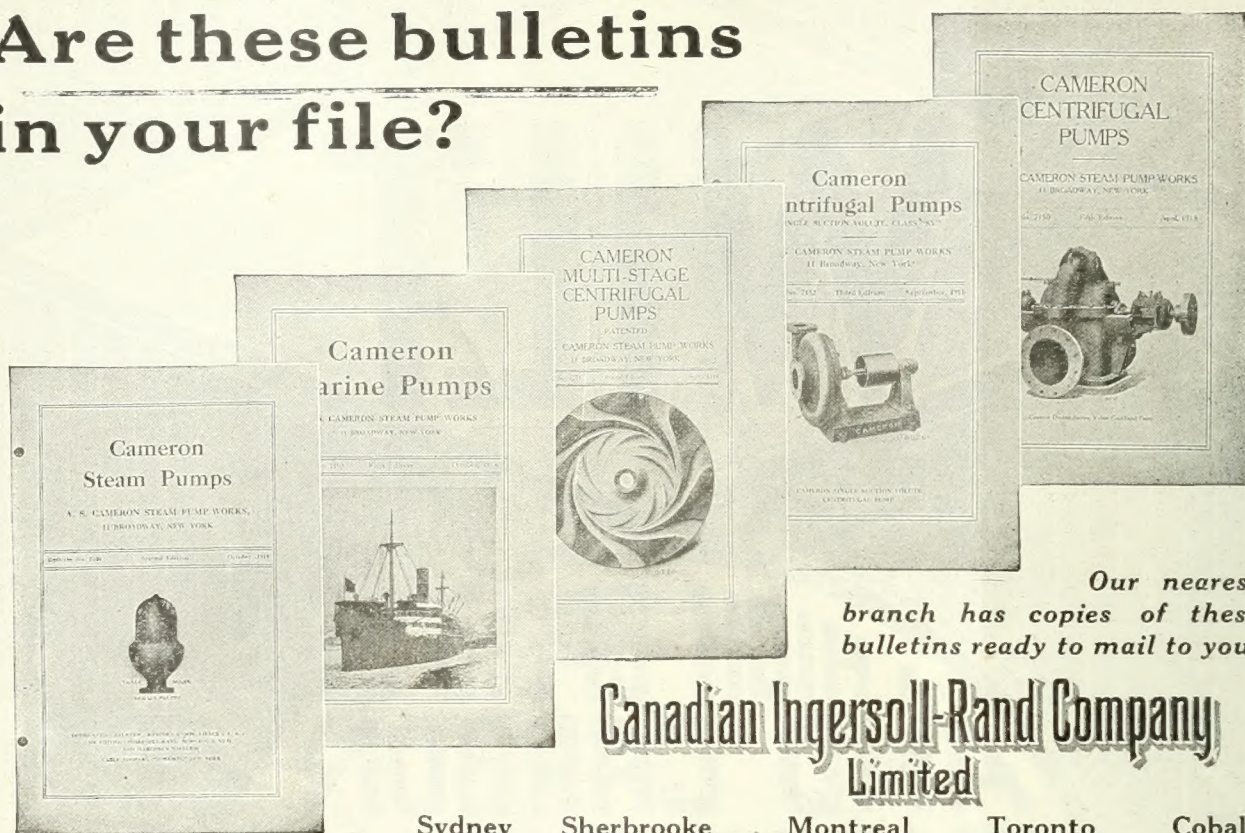
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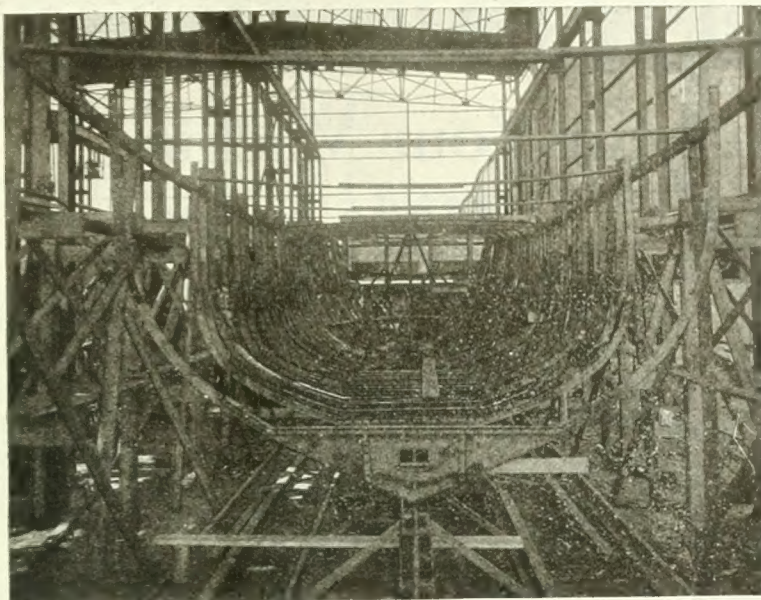
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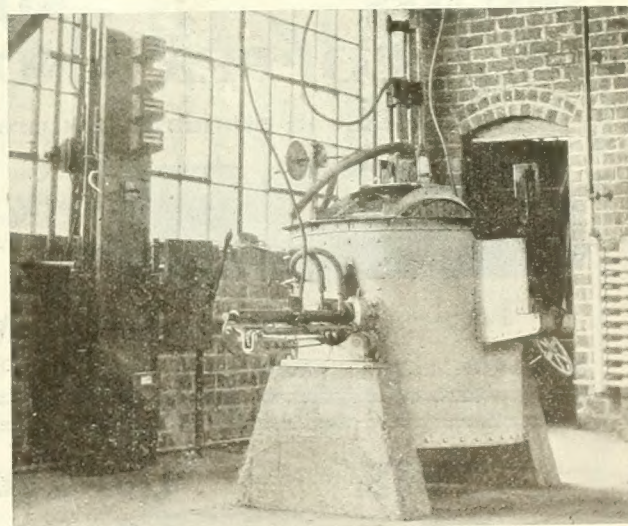
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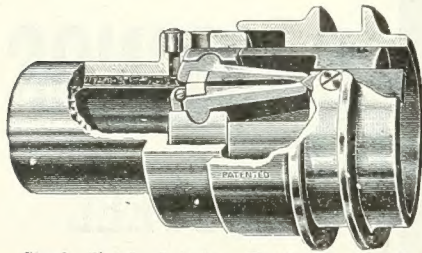
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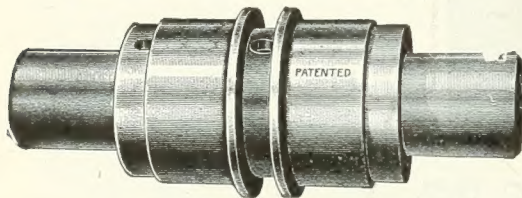
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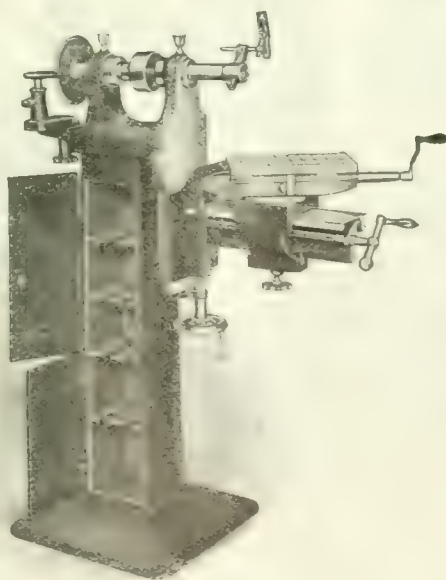
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Use Code—Banish

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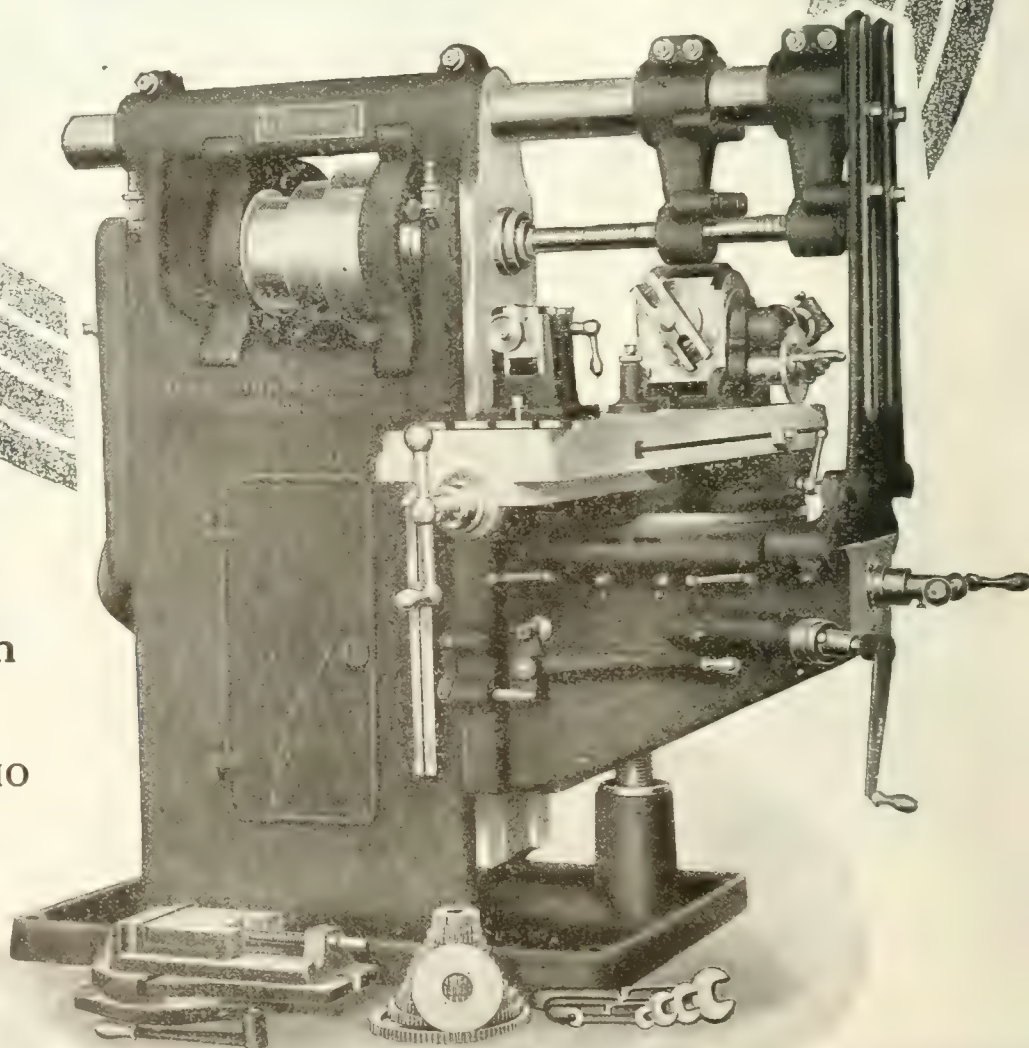
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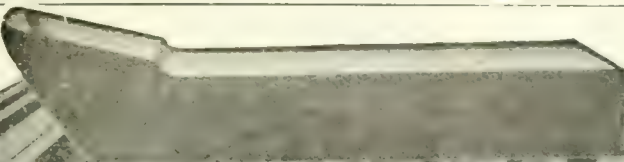
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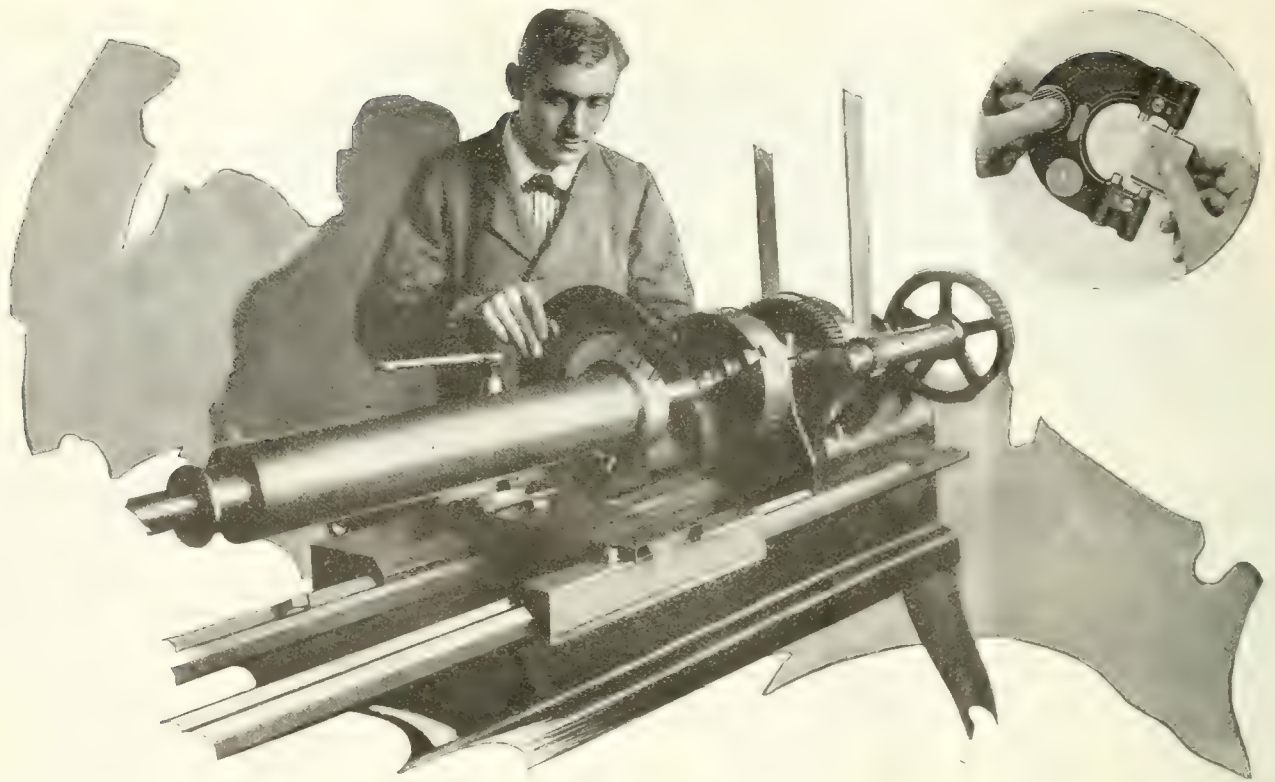
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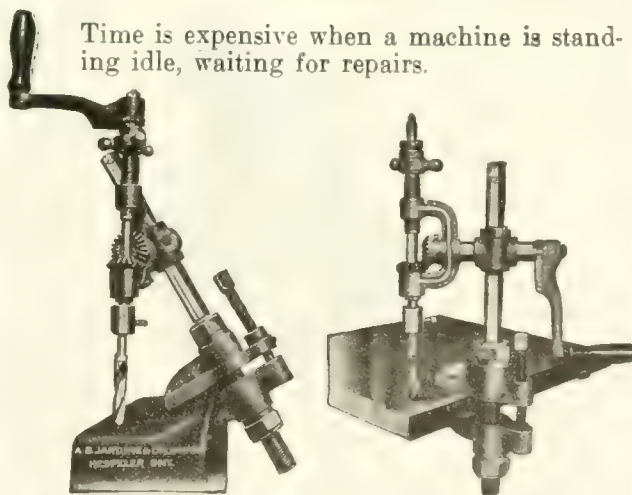
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Time is expensive when a machine is standing idle, waiting for repairs.



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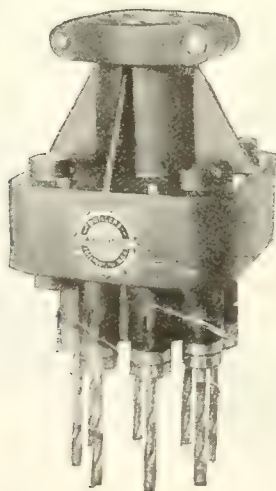
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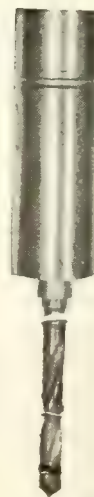
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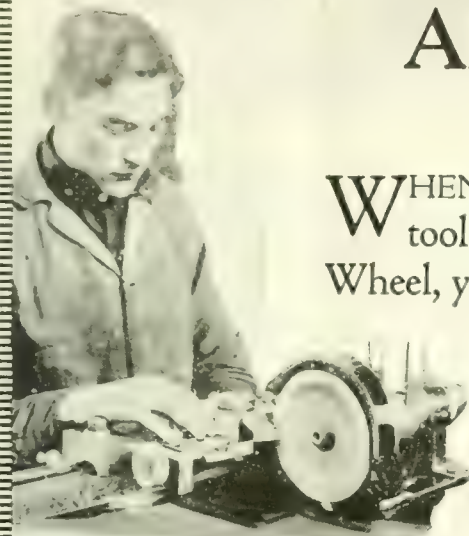
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They require comparatively little dressing and last long enough to be a real economy.

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"The Marshalltown Throatless Shears"

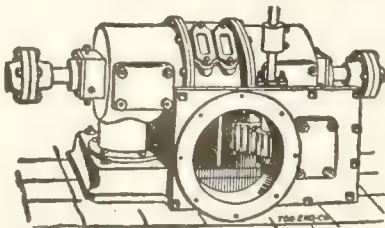
guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to $\frac{1}{4}$ " thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

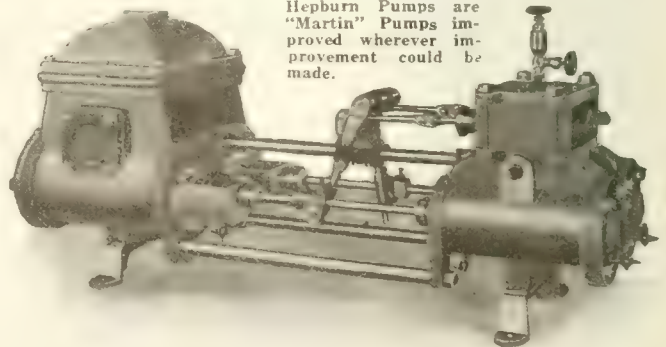
We solicit your inquiries.

THE J. C. WILSON MFG. CO.
LIMITED
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.



JOHN T. HEPBURN, LIMITED

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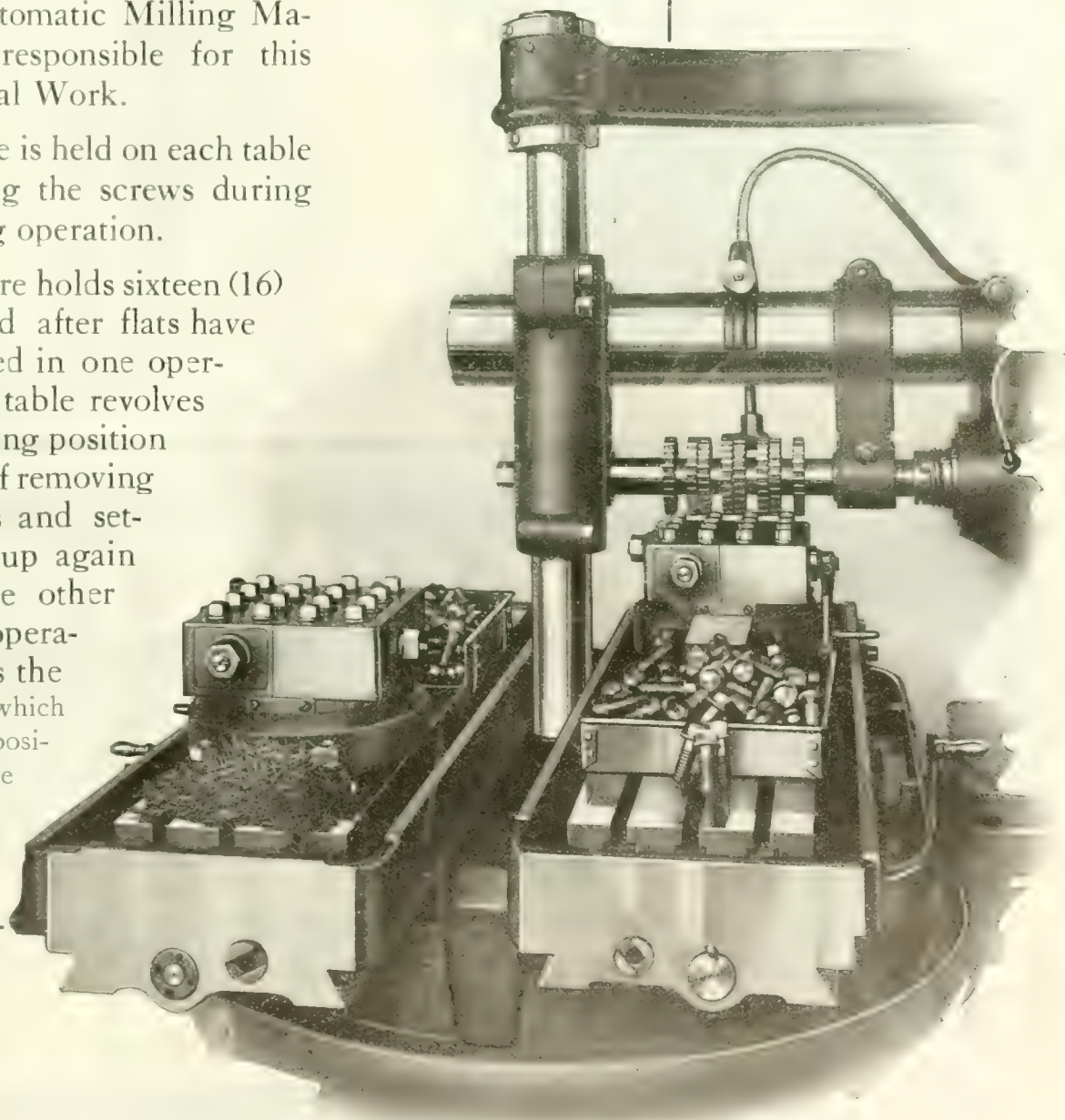
Toronto, Ontario

Economical Milling of Square Head Screws

The Potter & Johnston manufacturing Automatic Milling Machine is responsible for this Economical Work.

One fixture is held on each table for holding the screws during the milling operation.

Each fixture holds sixteen (16) screws and after flats have been milled in one operation—the table revolves to its loading position—instead of removing the pieces and setting them up again to mill the other flats—the operator indexes the fixture 90° which brings it in position for the next operation.



*Investigate the
method*

Bulletin No. 4

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 ROYAL BANK BUILDING, TORONTO, CANADA

Works and Warehouse: GALT, ONT., CANADA

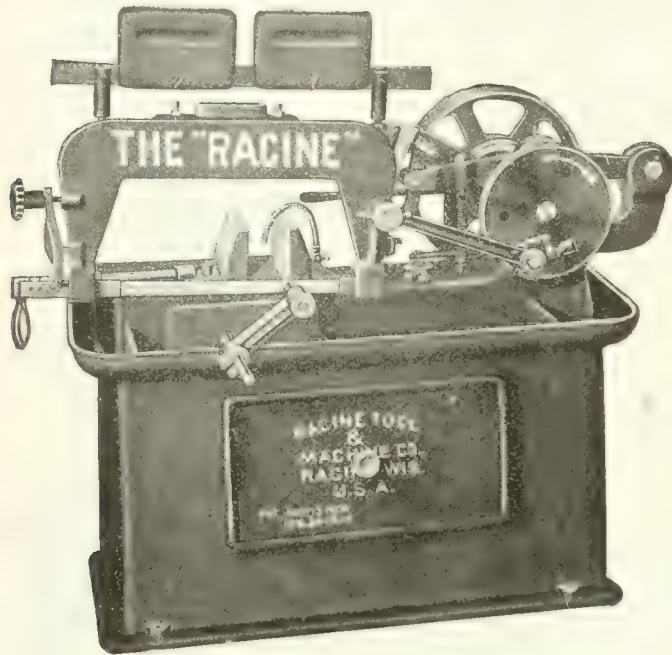
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*Standard the
World Over*

"THE RACINE"

**HIGH SPEED METAL
CUTTING MACHINE**

**Reduces
Blade Expense**



Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.
Melbourne Avenue, - RACINE WIS. U.S.A.



HOYT METALS

**"Frost King"
"Trojan"
"Nickle Genuine"
BABBITS**

Hoyt Metals have been used with great success for many years. Put them to the test and you'll soon see a difference in your babbitt cost.

All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

Annual sales over \$5,000,000.

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The machinist says:

"Sure I'm using them, the same as most of the men in the shop are doing. Some of the Starrett Tools in my kit, I bought when I was an apprentice.

"Y'see, it's like this. We got the habit when we were kids. We saw the older men, the ones that were doing the finer work, preferred Starrett Tools because they knew they were accurate, and we copied after 'em—just like our kids are doing today.

"How's that? No, I wouldn't go so far as to say that Starrett Tools by themselves will make a good machinist, but I'll say this—Starrett Tools will make it a lot easier for any machinist to do good work.

"Yes, I've got one of their 'Starrett Data Books for Machinists,' and believe me, it saves a lot of time and mistakes. If I want to know a decimal equivalent, a taper dimension, the speed of a milling cutter, or something about materials, I don't have to guess or ask—I just look in the book and find out. It set me back seventy-five cents at the hardware store, but it saved me a blame sight more than that in the first week."

The L. S. STARRETT COMPANY
THE WORLD'S GREATEST TOOLMAKERS
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.

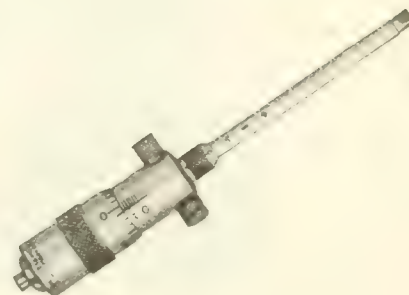
The utility and convenience of Starrett Tools are second only to their accuracy. Catalog No. 21"3" sent free on request.

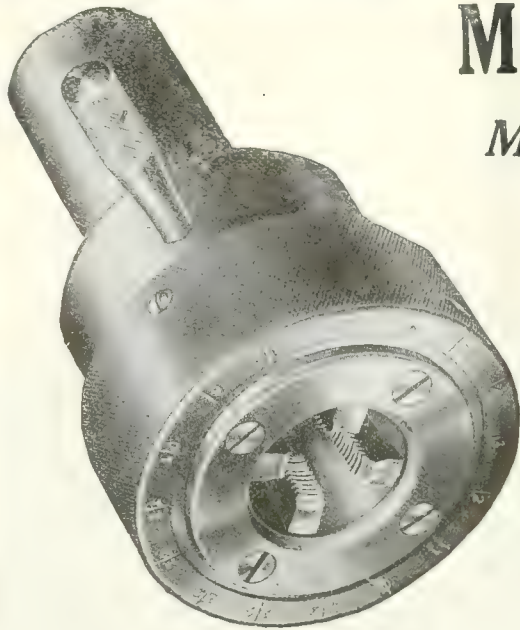


42-980



Starrett Tools

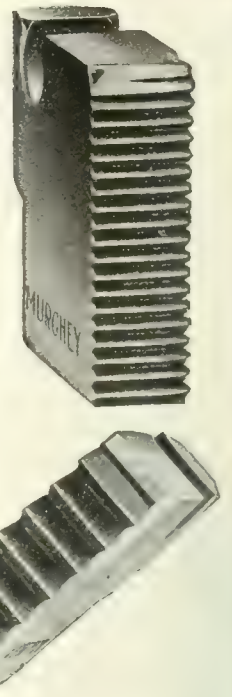




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Mean Quick Deliveries

Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?



Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

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THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne, FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France

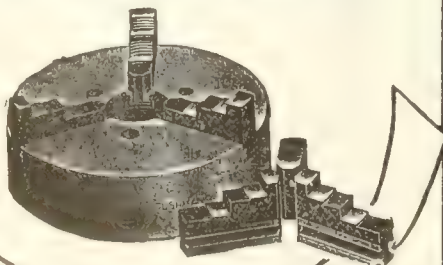
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We've been Manufacturing
**Nothing but Chucks
and Their Accessories**

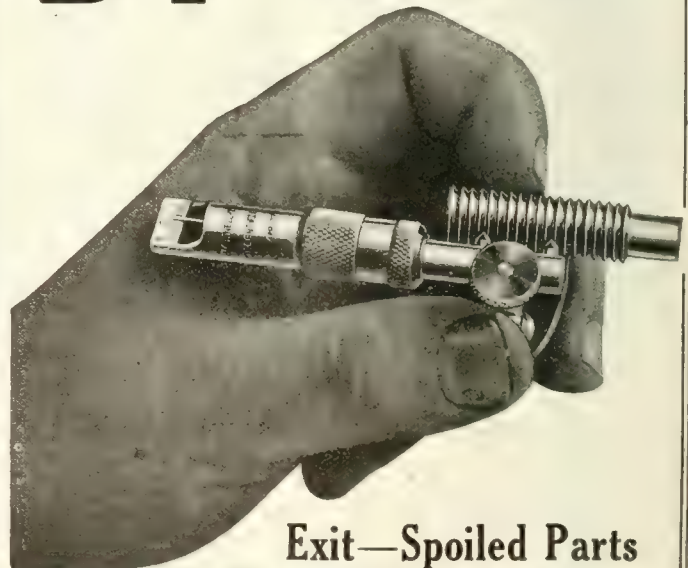
**FOR NEARLY 60 YEARS
AND OUR PRODUCTS SHOW IT**

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.



B-T THREAD LEAD INDICATOR



Exit—Spoiled Parts

Did you ever have to scrap a finished part because of incorrect measurement in lead? Were you ever forced, during a rush job, to thread a part again, because it didn't fit as it should?

B-T THREAD INDICATORS

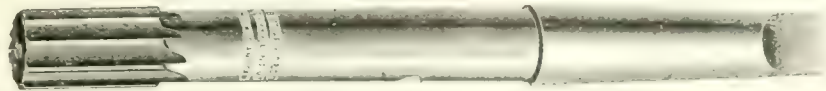
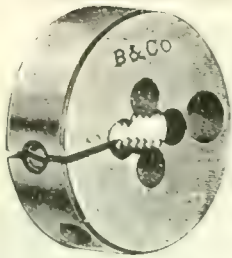
enable you to get the right thread instantly and maintain a constant check upon it. They will detect errors of one thousandth of an inch, can be used for testing odd and even pitches, as well as internal and external threads.

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BICKNELL-THOMAS CO., Greenfield, Mass.

Chicago Representative: H. S. Humeke, 15 N. Jefferson St. Pacific Coast Representative: The Chas. A. Dowd Sales Co., 229 Market St., San Francisco. Foreign Agents: Charles The J. S. Buckley Co., St. Nicholas Bldg., Montreal. England: Gaskell & Partners, Ltd., London, W.C. 2.

If interested tear out this page and place with letters to be answered.



Butterfield

Taps, Dies, Reamers, Drills, Milling Cutters

Butterfield quality gives the Maximum returns on your investment.

BECAUSE

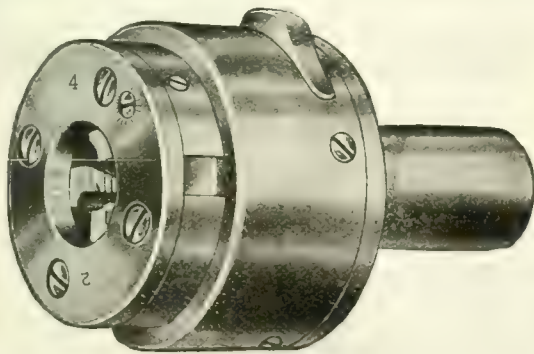
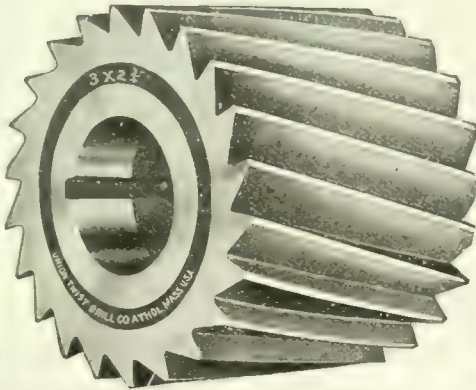
It ensures clean and accurate cuts and will duplicate the work over a long period of use.

Butterfield Quality is the result of 35 years' continuous effort to keep our product distinctly in the lead from the standpoint of efficiency and economy.

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**Butterfield & Co.
Inc., Rock Island, P.Q.**

Toronto Office: 220 King Street West



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1 1/4" and 1 1/2".

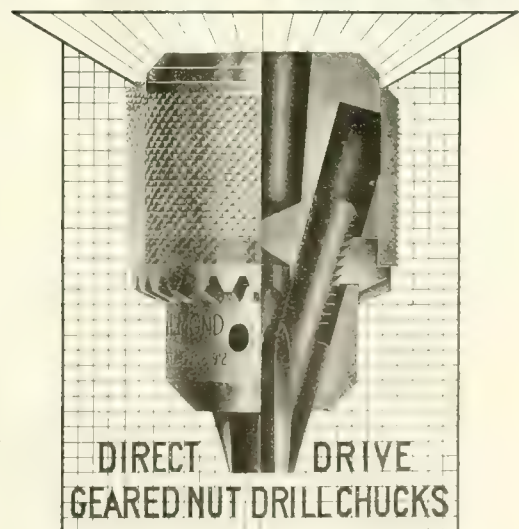
All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

ALMOND



TEETH cut on the nut giving DIRECT DRIVE and the hardened steel Pinion Bushings, which prevent wear, insure long life.

OTHER ALMOND PRODUCTS

LATHE CHUCKS, RIGHT ANGLE TRANSMISSIONS, MICROMETER CALIPERS, FLEXIBLE STEEL TUBING

T. R. Almond Mfg. Co., Ashburnham, Mass.

Customers Are Satisfied

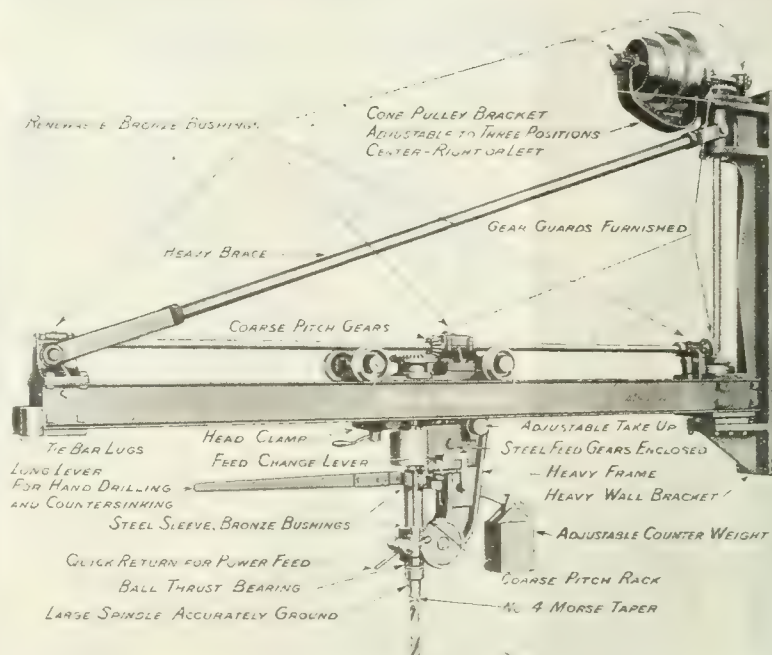
with the performance of this machine in their works. A recent letter to us states: "Regarding the WALL RADIAL DRILL, this is operating every day, and we are more than pleased with the results we are getting from the use of this tool. In all probability we will install additional ones later on." Our deliveries are getting further away each day. Better take advantage of the present conditions.

Want our detailed bulletin? You'll be interested in noting the construction of this machine, as given in same.

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.

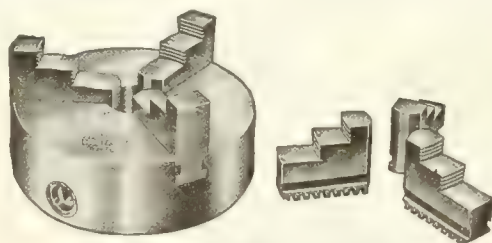


LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue

Dept. B

BOSTON, MASS.



No. 153 with Two Sets of Jaws.

Union Geared Scroll Chucks

Have many points to recommend them. **SOLID BODY**—Gives strength and rigidity. **WEIGHT**—All parts are heavy and strong, and reinforced where necessary.

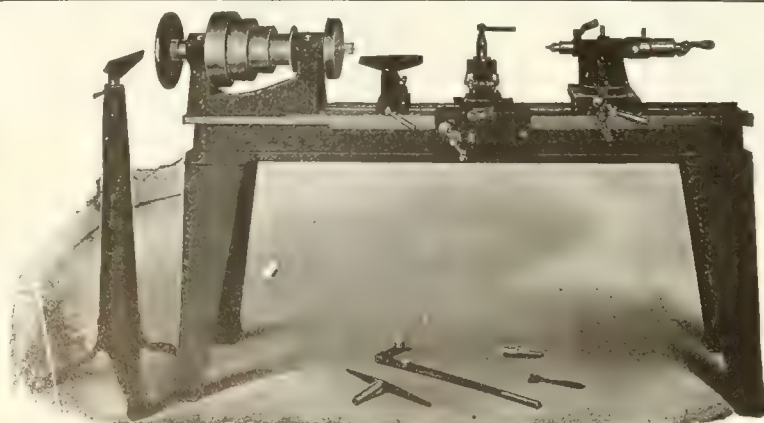
QUALITY OF MATERIAL—Best that can be procured.

LAST AND BEST OF ALL—ACCURACY. Union Chucks are Accurate.

UNION MANUFACTURING COMPANY - New Britain, Conn., U.S.A.

26 Cortlandt Street, New York

Makers of a Complete Line of Chucks



A Favorite—

Blount Pattern-makers' Lathe

FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY

EVERETT, MASS., U.S.A.

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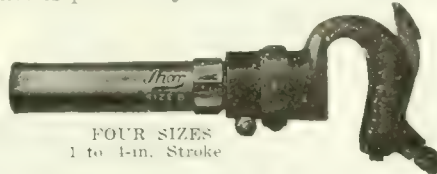
CHIPPING HAMMERS

Thor Predominates wherever chippers are used because:

- 1st. The main valve is large in size and durable, being of the balanced type and having a bearing surface of three square inches.
- 2nd. Two square inches of the bearing surface retain the lubrication constantly, as no air passes over to blow the oil off.
- 3rd. The handle is equipped with a self-seating throttle valve, which eliminates all leaks.
- 4th. The barrel and all working parts are hardened and ground and the hammer is practically free from vibration.



Drilling in concrete with a size D hammer with a hexagon nozzle. Will drill a hole one inch in diameter, at the rate of one inch per minute.



Riveting Base Plates with Size B hammer. Let our service engineer call at your plant and explain the various uses to which these hammers can be adapted, and how to obtain the best results on your particular work.

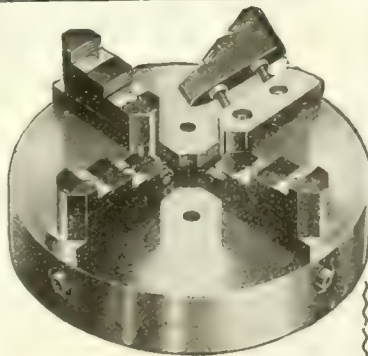
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SKINNER CHUCKS

Over 30 years of satisfactory service have placed these chucks where they belong—



On many of America's best machine tools
In many of the better metal working plants of the world—
In the highest esteem of thousands of operators.

If you use chucks, investigate the Skinner line. It will pay you.

THE SKINNER CHUCK CO.

New Britain, Conn.

New York Office:
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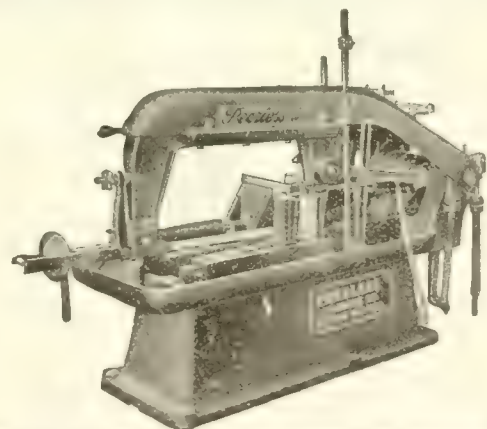
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Would you like to have us prove that

Peerless ^{HIGH} SPEED

Machines do 50 to 100% more work



The Peerless has established a new standard of production in so many plants that we are ready to ship one at our expense and risk, if you agree to give it a thorough test. A trial like this often results in our selling from 1 to 10 machines.

The Balance Lift of the Peerless

automatically raises the blade for the return stroke. This greatly prolongs the life of the blades, economizes power, and increases production. There are more good features which we shall be glad to acquaint you with.

The Peerless assures you the peak of production at very lowest cost. Write for full details.

PEERLESS MACHINE CO.

1607 RACINE STREET

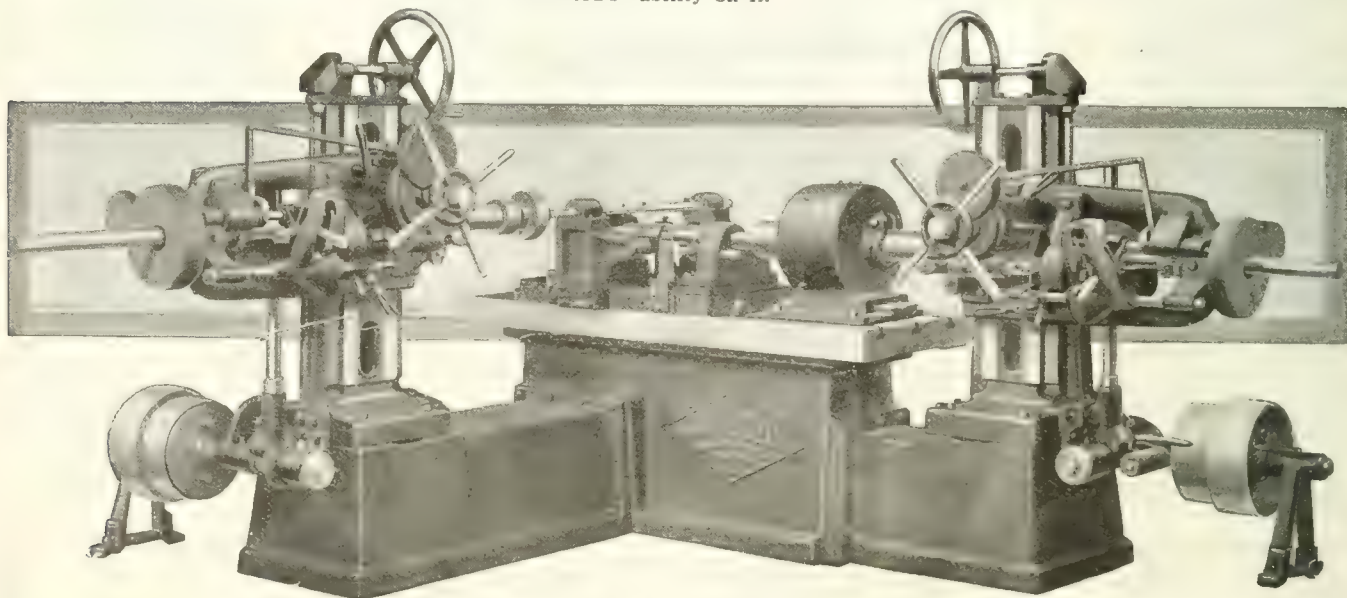
RACINE, WISCONSIN

Rockford Horizontal Boring Machine

**For
Automobile
Manufacture**

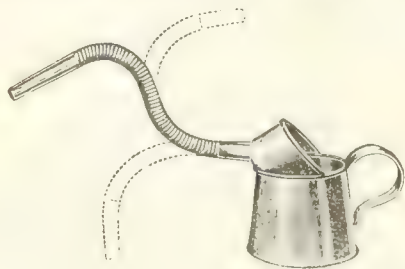
This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

**Say Good-bye to Funnels
Use this "ALL-WAY" Oiler**



Combination Filler and Funnel

This Filler eliminates the necessity of the use of a separate Funnel. With the Flexible Spout any part can be readily reached.

Saves much inconvenience and avoids dripping of oil.

If your dealer cannot supply you, write us.

We also manufacture the well-known "All-Way" Oil can. Saves you 50% of your oil bill.

THE ALL-WAY OILER MFG. COMPANY

196 King St. West

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P X H

TRADE MARK

Our contribution to the demand for increased production is a better file.

A trial of either P. H. or IMPERIAL Files will prove this.

We searched the continent until we found the best file steel procurable—Clay Crucible Cast Steel.

We employ only skilled workers.

Result: "They cut faster and wear longer."

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Whitcomb-Blaisdell Planers

WHITCOMB-BLAISDELL LATHES AND PLANERS PLAY SOME PART IN THE MOST OF THE HIGH-GRADE MACHINE TOOLS MADE ON THE CONTINENT.

ALL-ROUND machines for high grade work, they are equipped with special labor-saving attachments that add to their convenience and enable the operator to "speed up" without endangering accuracy.

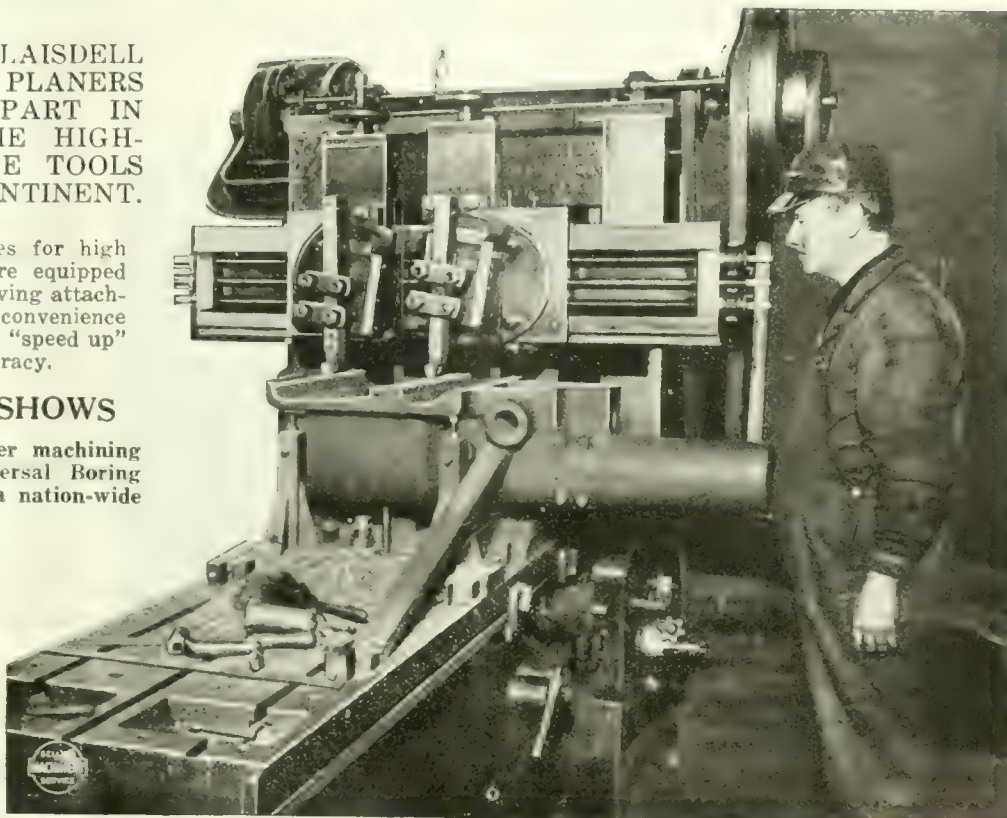
ILLUSTRATION SHOWS

a Whitcomb-Blaisdell Planer machining the head post of a Universal Boring Machine—a machine with a nation-wide reputation for accuracy.

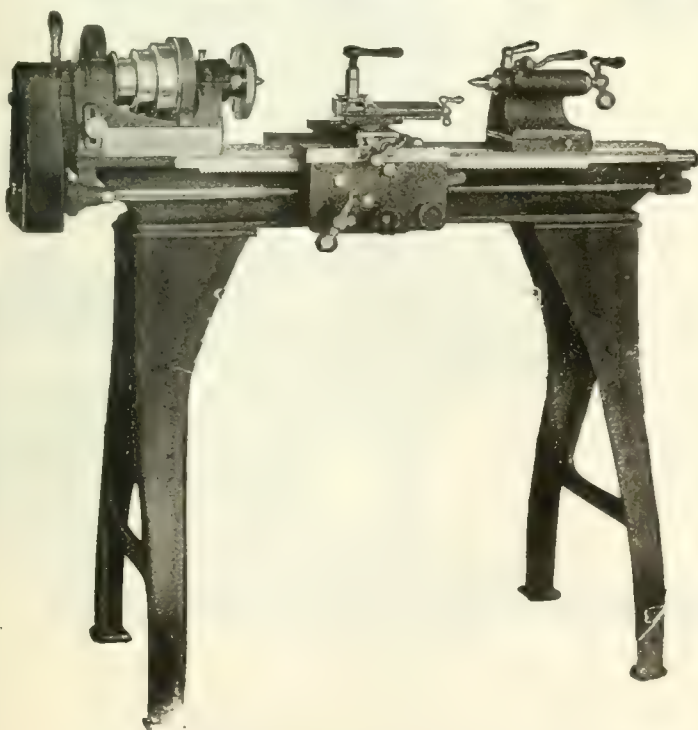
May we send you our catalogue giving full particulars?

**Whitcomb-Blaisdell
Machine Tool Co.**

**WORCESTER, MASS.
U.S.A.**



"STAR" LATHES



**ACCURATE
RIGID
ECONOMICAL**

9" - 11" - 12" - 13" Sizes

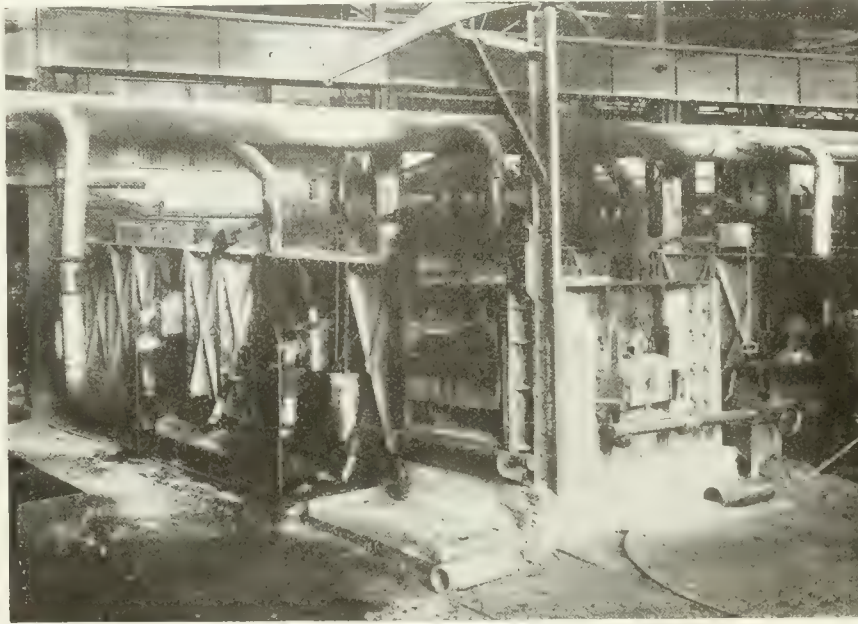
Built with a full line of
ATTACHMENTS

The Seneca Falls Mfg. Co.
Inc.

366 W. Fall St. - Seneca Falls, N.Y.

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the



"Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.

Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering

Company, Limited

Room 308, Bank of Toronto Bldg., Montreal
Three Rivers, Quebec, Canada

BECKER BELT-DRIVEN MILLERS for

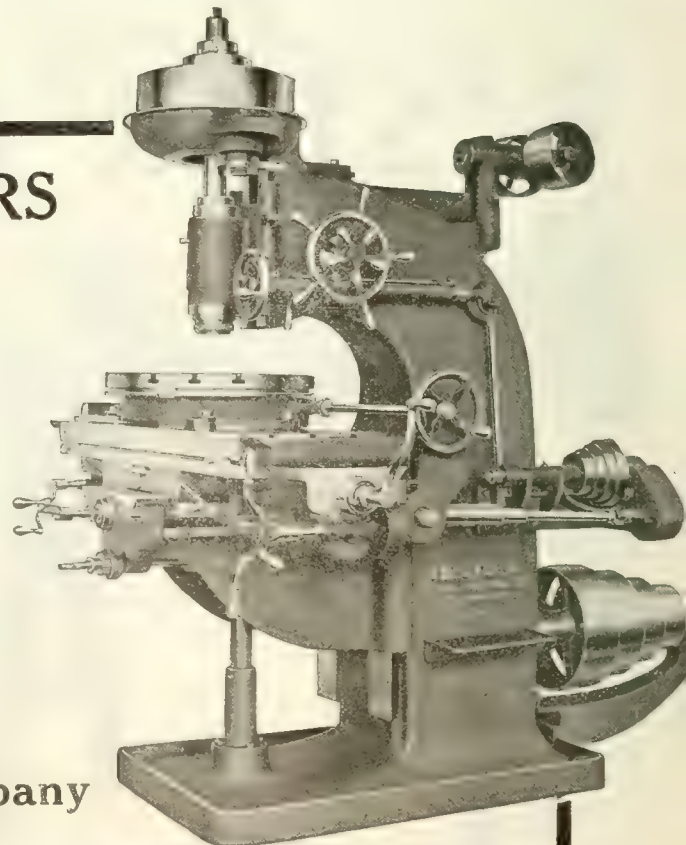
GREATER PRODUCTION because they work continuously—every hour of operation is a production hour—

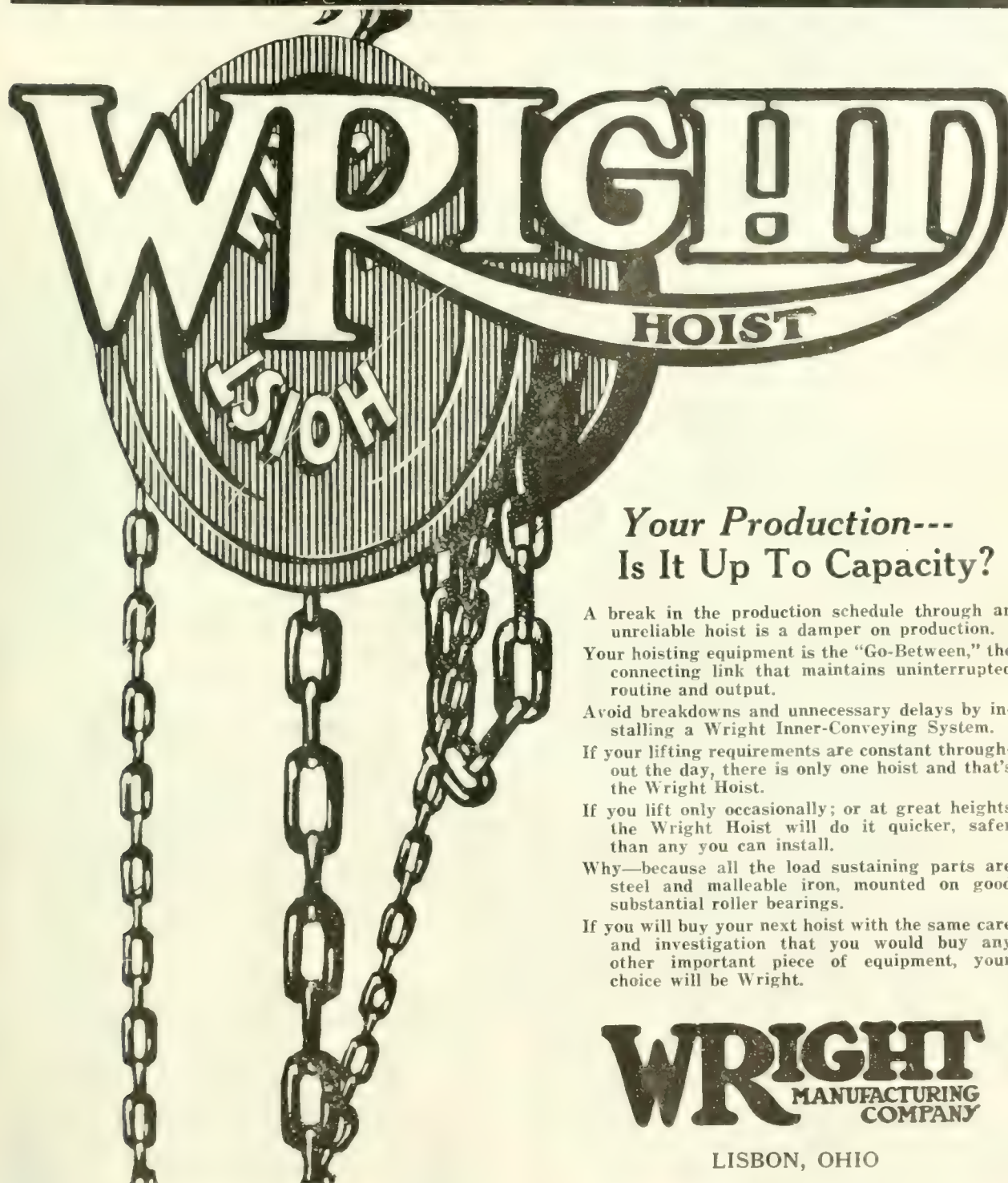
ECONOMY OF OPERATION because they are power savers; the internal belt drive forms an elastic drive to the spindle that prolongs the life of the cutter by eliminating chatter and vibration.

ACCURACY because the machines have exceptionally fine feeds and are equipped with micrometer dials and stop gauges. The Patent Becker Gibbing keeps the work permanently aligned with the spindle.

Becker Milling Machine Company
HYDE PARK, BOSTON, MASS.

A. R. WILLIAMS MACHINERY COMPANY, LIMITED - 64 FRONT STREET WEST, TORONTO
RUDEL-BELNAP MACHINERY COMPANY, LIMITED 137 MCGILL STREET, MONTREAL





Your Production--- Is It Up To Capacity?

A break in the production schedule through an unreliable hoist is a damper on production.

Your hoisting equipment is the "Go-Between," the connecting link that maintains uninterrupted routine and output.

Avoid breakdowns and unnecessary delays by installing a Wright Inner-Conveying System.

If your lifting requirements are constant throughout the day, there is only one hoist and that's the Wright Hoist.

If you lift only occasionally; or at great heights the Wright Hoist will do it quicker, safer than any you can install.

Why—because all the load sustaining parts are steel and malleable iron, mounted on good substantial roller bearings.

If you will buy your next hoist with the same care and investigation that you would buy any other important piece of equipment, your choice will be Wright.

WRIGHT

MANUFACTURING
COMPANY

LISBON, OHIO

Send for our Catalog to-day on Improved Hoists, Trolleys, Hand Cranes and other lifting equipment.

A good piece of advice:

BUY WRIGHT



Canadian Representatives

A. R. Williams Machinery Co., Ltd.

Toronto, Halifax, Montreal, St. Johns, Winnipeg, Vancouver

Notes On Grinding

NORTON COMPANY WORCESTER, MASS.

No. 65A

HAND GRINDING AND MACHINE GRINDING

ONE is likely to confuse hand grinding and machine grinding when thinking of some of the principles that govern the grinding action of a wheel. Now it is quite an important factor in the selection of the right kind of wheels for these two different methods of grinding, and so it seems necessary to point out some of the differences existing between machine grinding and hand grinding, so that these differences can be taken into consideration when grinding problems in either class come before our readers.

Of course, in both methods of grinding, that in which the work is held in the machine mechanically and passed before the wheel mechanically, and the class where the work is held in the hands of the operator and pressed against the wheel manually, the same general principles govern the results that are obtained—that is, the grain depth of cut, the radial depth of cut, the speed of wheel relative to these cuts, the kinds of material being ground, etc., all have their bearing on the resulting grinding wheel efficiency.

In both methods of grinding the construction of the machine plays an important part. The facts that the centres in the machine grinding method, the headstock, the table, the machine itself and all associated parts are heavy, rigid and substantial, and that they absorb vibration and permit of greater power being applied to the grinding wheel, carry equal weight in the hand grinding method where the work rest, upon which the work being ground is placed, is strong and rigid, offering a good support in case the work is carried up close to the cutting point of a wheel. There is no chance for vibration or cramping action if the spindles and bearings are generous in size and well made, and, therefore, better results are obtained.

There is one factor in hand grinding that does not allow for definite rules to be laid down, and does not permit of the same reasoning that can be applied to machine grinding, and that is the personal element that enters into this operation. Some men become very proficient in hand grinding. They know just how hard to bear on with the work in order to make the wheel cut freely and efficiently. They know just when it is necessary to dress the wheel, to break up the face or surface, in order to produce certain results. They know when the wheel is being burdened with more work than it can do, and they unconsciously and instinctively accommodate themselves to these conditions. They ease up on the depth of cut or pressure that they bring to bear between the wheel and the work, and pass the work over the face of the wheel quickly in order to accomplish certain results. They press or bear on to accomplish certain other results. There is really a considerable amount of art necessary in hand grinding, as well as in machine grinding, but always bear in mind that this personal equation is a factor which may introduce indifferent results or very satisfactory results when work, wheel and conditions may be the same, but two different men operate the machine at different times.

The tendency in hand grinding, as in machine grinding, is toward harder wheels. However, in either case, soft wheels are better producers.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec Que.

Grinding Wheel Plants, Worcester, Mass.

Electric Furnace Plants	New York Store	Chicago Store
Niagara Falls, N.Y.	Chippawa, Ont.	151 Chambers St. Jefferson St.
	Detroit Store, 73-75 W. Congress St.	



Men Can't Work Well With Dull Files

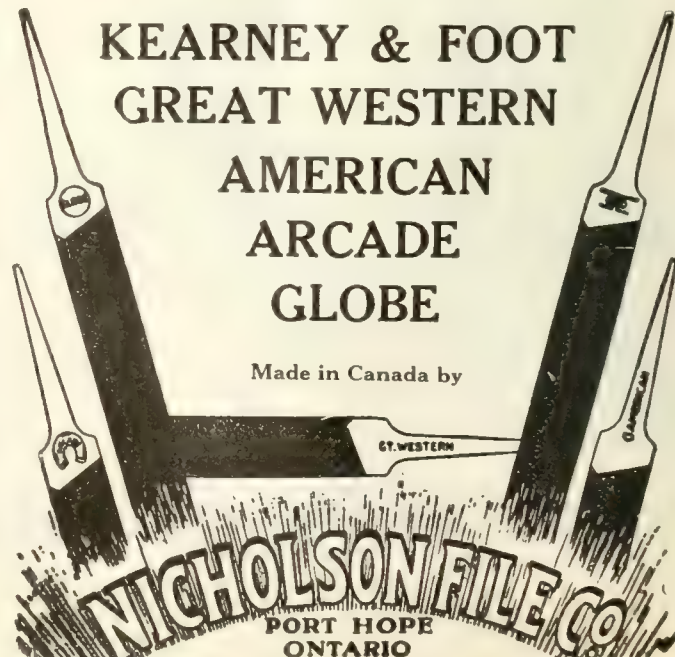
Tell your men to turn them in as soon as their teeth lose their edge, and get new ones.

And, specify Famous Five Files when you order.

They are made of high grade steel, accurately ground and cut, scientifically hardened; and you will get the maximum of service out of them. They are:

**KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE**

Made in Canada by



If interested tear out this page and place with letters to be answered.

DUNLOP

"Gibraltar RedSpecial" Belting

"THE ORIGINAL RED FRICTIONED-SURFACE RUBBER BELTING"

WHEN it's a question of unusual achievements in Belting, "Gibraltar RedSpecial" stands supreme.

As an effective means of trimming down "overhead" it is known far and wide.

This Red Frictioned-Surface Belt has dominated the field since its inception.

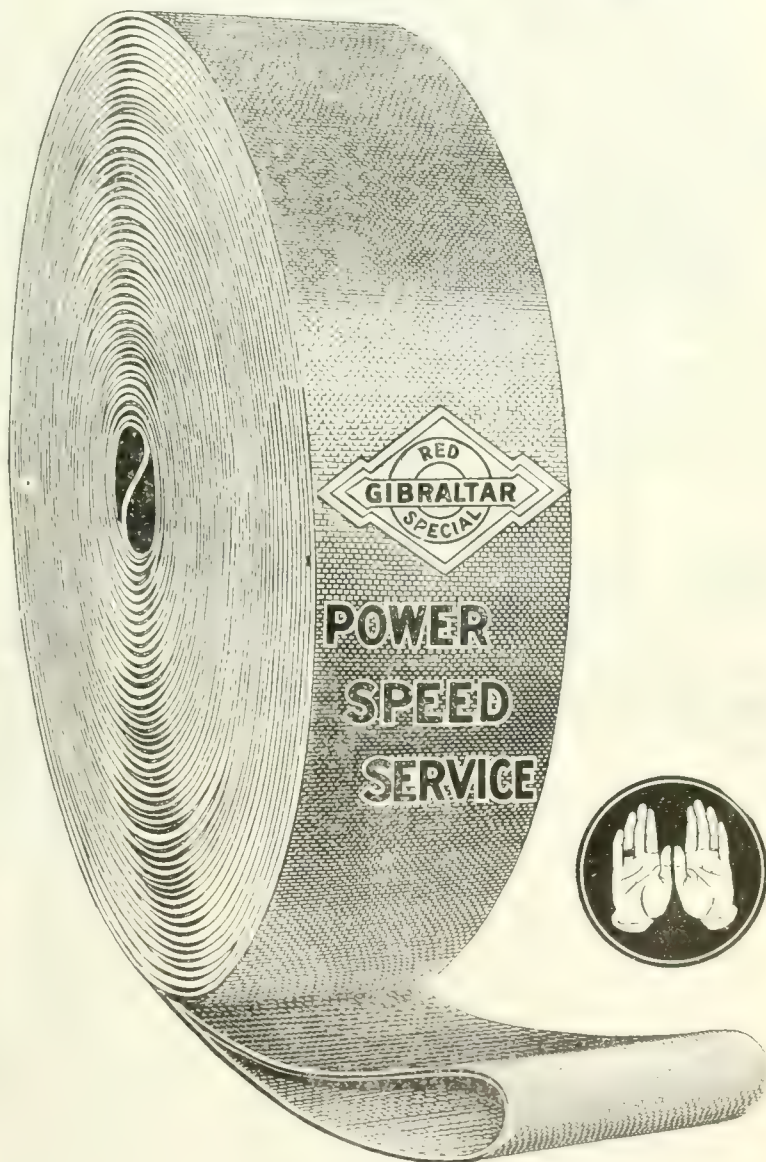
Without variation this belt has lived up to the exacting standard of service set by us when it was first introduced to belt buyers.

Having been tested and tried to the limit in all manner of places—and by thousands of users throughout the country from the Atlantic to the Pacific—"Gibraltar RedSpecial" will also secure you against the uncertainties which surround the use of "just-as-good" brands.

The price may be higher than that of "ordinary" belts, but the service is long and satisfactory in the extreme, as a multitude of long-time users will gladly testify.

With the Dunlop Unreserved Guarantee which goes with every belt, you should have no hesitation in making your next order read "Gibraltar RedSpecial."

You know the Dunlop reputation for square-dealing, too.



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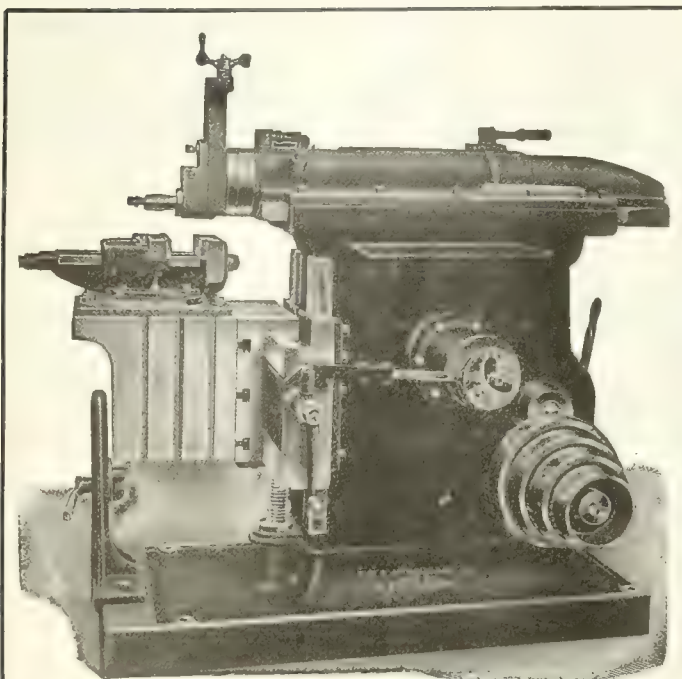
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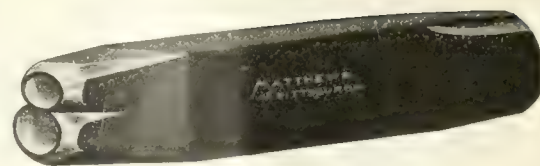
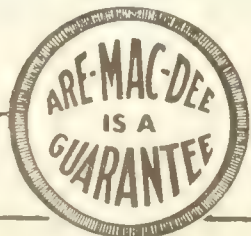
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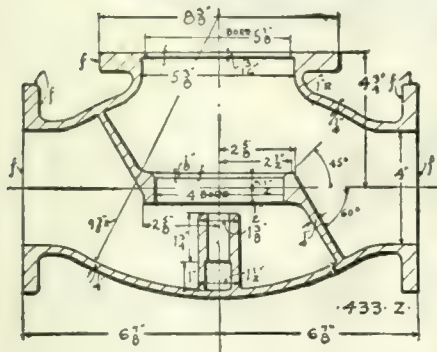
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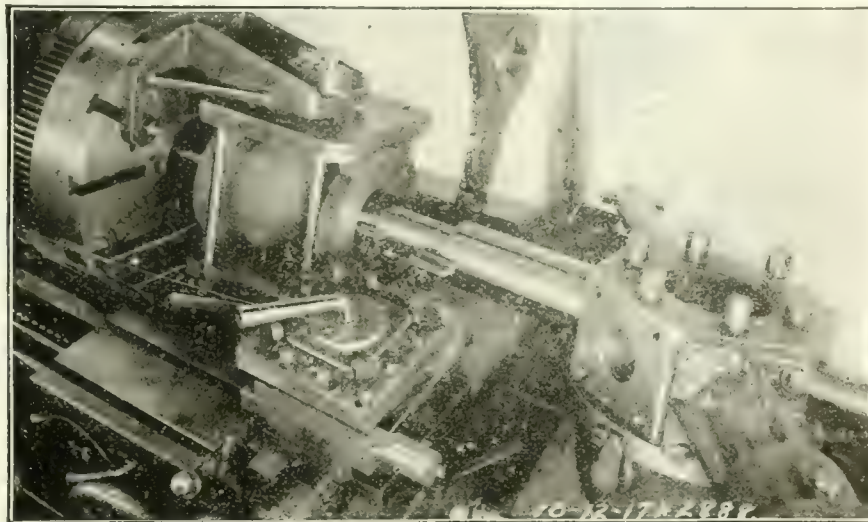




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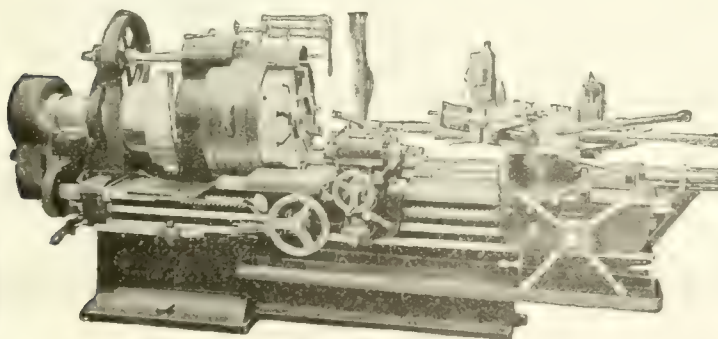


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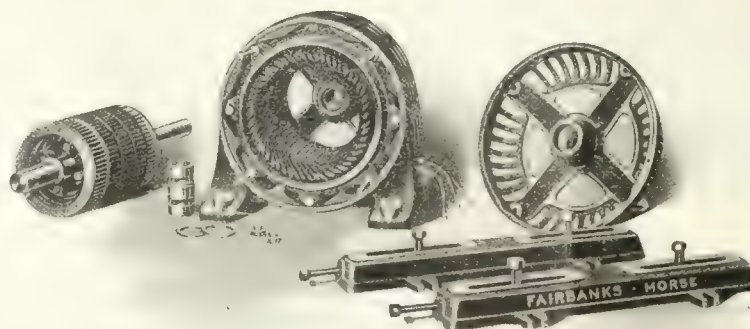


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CANADIAN MACHINERY AND MANUFACTURING NEWS

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October 9, 1919

The Blazing of New Industrial Trails

How the Bureau of Standards at Washington is Leading the Home Manufacturers to Fresh Fields—An Example to Canada and Canadians in General. Herein is a Challenge Worthy of Acceptance

By NAPIER MOORE

WITH the Canadian manufacturer bending all his efforts to get back to a pre-war basis now that official proclamation of peace is at hand, it is natural to suppose that he has an eye on his neighbor across the international border and is interested in what Uncle Sam has done by way of helping his manufacturers to compete with foreign trade and genius and break monopolies which continental Europeans held in certain industries before the war.

Probably no department of the American Government has done more for the manufacturer than the Bureau of Standards at Washington. Before the war the Bureau was investigating those fields of finer industry in which the foreigner apparently stood alone. The world conflict, with its consequent disruption of trade with Europe, served to emphasize still further the need for further effort in this direction. Data, painstakingly gathered during long processes of experiment by the experts of the Bureau were placed at the disposal of manufacturers, secrets were fathomed, and to-day, in more than one sphere, American factories are turning out products which five years ago were left to the European.

What Canada Has So Far Accomplished

In Canada, the Bureau of Standards of the Imperial Munitions Board did excellent work, but the exigencies of the situation practically confined its efforts to war work. And, in a broad manner of speaking, the Dominion Government's Bureau of Standards at Ottawa has been little more than a weights, measures, checking and testing office. Happily, Canada has realized the incalculable value of a bureau such as is found at Washington, and the recent appearance before an Ottawa Parliamentary committee of Dr. S. W. Stratton, Director of the American Bureau of Standards, indicates that in the near future the Dominion Bureau of Standards will be in a position to extend help and advice to the Canadian manufacturer that it has hitherto not been in a position to extend.

Through the courtesy of Mr. F. A. Fisher, the writer was recently enabled to make a thorough tour of the Washington Bureau of Standards, and to observe at close range the many activities in which its experts are engaged. To describe them all would necessitate the penning of a massive volume. They included, during the war, experiments with dyes and chemicals for industry and science; new methods for the manufacture of ammonia were tried; the recoil of great guns was tested, as were airplane wings, the latter in the monster wind tunnel. Airplane fabrics, varnishes and motors were

tested; improvements in aerial photography were discovered. New recording instruments were designed and perfected. Optical glass was made for the first time on American soil, and the manufacture of delicate precision gages made an actuality.

And the good work done by the Bureau did not end with the war; its discoveries stand as a permanent aid to peaceful industry.

The Fostering of the Hoke Gages

In this day of interchangeability, when parts are manufactured at plants thousands of miles apart to be assembled at a central point, perhaps on this continent, perhaps abroad, the fostering of Major W. E. Hoke and his precision gages by the Bureau of Standards will, it is expected, be more than proved to have been a commendable step. For a dozen years and more Canadian and American manufacturers have been acquainted with the famous Johansson gages—those shiny, rectangular blocks of steel, capable of measuring to within one hundred thousandth of an inch, and even with still greater precision. What system of seasoning Johansson uses for his steel, what system of measurement he employs to obtain such miraculous results, nobody has yet ascertained. Until comparatively few months ago, the "Joe" blocks stood alone as a workable standard of measurement in American and Canadian factories. More than a thousand American shops swore by them.

Then along came Hoke. He told the Bureau of Standards he could make gages as good as or better than Johansson's gages, gages that would be accurate to a few millionths of an inch (the majority of which would prove accurate to within one millionth of an inch).

Director Stratton immediately gave Hoke the chance to make good his claim. Part of the Bureau's workshop was placed at the inventor's disposal. In three days he had set up his machinery and was turning out gages. Within one month he was manufacturing gages which no mechanical instrument could test, so fine was their degree of accuracy. To-day, apart from the Bureau of Standards, two private firms, one of them the Pratt & Whitney Company, of Hartford, Conn., have Hoke's secret, and the former is turning out quantities of gages for commercial use which are sent to Washington for careful checking up of their accuracy.

Has Hoke Beat Johansson's Method?

Whether or not Major Hoke has discovered a method of retaining the constancy of steel as Johansson has done, time alone can tell. He claims he has. Certainly

no experiment is being spared to achieve this important end.

To back up his claims of greater accuracy, Hoke draws on science for the court of last resort in measurement known to the Bureau of Standards—the interferometer, or light wave method, capable of measuring to within millionths of an inch. Flatter and more parallel surfaces, obtained by his own lapping machine, and a system of working by “accumulative error,” are the qualities that ensure a more perfect gage, Major Hoke asserts, and to the Major the writer was indebted for a morning of extraordinary interest, spent in wandering through his workshop and seeing, under his guidance, just “how it is done.”

It was as a working tool that Hoke saw his gages, and the problem of equal accuracy for quantity production was one that he overcame by his application of the “accumulative error,” or “symmetrical distribution of error” system. With ten of its one-inch blocks placed alongside of a standard Johansson ten-inch block, the variation of which has been checked by the Bureau’s optical department to within a millionth of an inch, the aggregate error of the ten individual blocks at once becomes glaringly apparent under the delicate tests used. As an error of, say, three millionths of an inch is glaring when exposed by the cadmium light of the interferometer.

The demand, then, was to reduce the surfaces of the gages to an absolutely uniform degree of parallelism and flatness, and it is here that the Hoke lapping machine comes in. It is claimed that this machine works to a tolerance of three millionths of an inch, and the flatness of its plates is checked to within that leeway. By a carefully timed method of transposing the little cylindrical blocks diametrically at intervals during the lapping operation, combined with rotary movements which ensure every molecule of the steel’s surface receiving uniform treatment, perfect equalization is arrived at. Naturally when gages are being turned out in quantities, during the process of manufacture each gage cannot be checked after each operation by the method of light ray measurement. The blocks are, therefore, at various stages of their manufacture comparatively checked with the highest working standard in the possession of the Bureau—that is, Johansson blocks, the accuracy and constancy of which have been most carefully established. With sufficient time to be assured of the constant quality of the steel of the American-made gages, it is likely that the domestic sets will be used as standards. Constancy, of course, is only provable by time, and years must elapse before the American gage makers can be positive that they have the constancy for which the Johansson gages have become famous, and on which, of course, ultimate accuracy depends.

The Use of the Interferometer

Hoke was not satisfied to prove his accuracy by the known variations of any standard, however. Only one method would satisfy him, and that was the court of last resort in measurement—the interferometer. True, the Bureau possessed its standard yard, checked carefully against international metre in Paris, but even the international metre rod is not perfect. It is susceptible to changes of temperature, even as are gage blocks, be the change so slight as to be incalculable by human means. Twenty years ago, however, Professor Albert A. Michelson, of Chicago, went to Paris, and, taking the international metre as the recognized world standard, calculated the number of light waves it equalled. And it is to the standard of the light wave, easily applicable by means of an improved and simplified interferometer devised for the Bureau of Standards by C. G. Peters, that Major Hoke works. He uses cadmium rays, 24,098 waves of which equal one inch.

The method of measurement by light interference has received lengthy treatment in several American technical magazines of late, and it would serve no purpose to repeat details here. Sufficient to say that it has apparently

established the superiority of “end” measurement over “line” measurement, under the latter of which even the finest of fine scratches on a measuring rod possesses thickness and so renders absolutely perfect comparison impossible.

The writer witnessed Major Hoke test some of his gages by this light method, detecting errors in flatness of millionths of an inch. The difference in flatness caused by a finger print became as a glaring error in terms of millionths.

To such a standard of accuracy does Hoke work. To what standard Johansson works is a carefully preserved secret. That he does not depend on the interferometer is known, however. He even claims that light waves are inaccurate, and that his gages are of greater accuracy because of more dependable methods that he has worked out. In effect he claims that the new American-made gages cannot be as accurate as his because they are made to a standard which, while regarded as the last word in measurement by the Bureau of Standards, is one which his investigations have shown him is not absolutely dependable. He has yet to prove it. Should he be able to—and all things are possible—science would receive almost as big a jolt as it would were it demonstrated that the world is flat. It is said that Johansson has given much attention to the study of light waves and may soon announce some of his findings.

Real Competition With the Foreign Product

Meanwhile, American-made gages have made possible a real competition with the foreign product.

Major Hoke is still experimenting with the Bureau of Standards. He has applied his discovery to the production of precision ball bearings, and is now working on a new method for the seasoning of his steel. He recognizes that the value of all precision products lies largely in so seasoning steel that it will “stay put.” The steel from which the highly accurate Johansson blocks are made has been analyzed repeatedly, and Major Hoke believes he is on the road toward discovering the valuable secrets of the Swedish steel workers.

The Manufacture of Optical Glass

One of the most striking successes achieved by the Bureau of Standards has been in the manufacture of optical glass. Previous to the outbreak of the war, practically all of the optical glass used in America came from a few German, French and English makers. At that time the total annual world demand amounted to but a hundred or two tons. Some secret processes were involved, and no American firm had cared to go to the expense necessary to any investigation upon which manufacture could be based. Therefore, absolutely dependent as she was on these European countries for her optical glass, America was faced with a somewhat grave problem when her supply was cut off by the opening of hostilities.

It was then that the Bureau of Standards came to the rescue. Its experts applied themselves to research and experiment with commendable enthusiasm, and in the winter of 1914 experimental furnaces and auxiliary apparatus was set up in the Bureau’s Pittsburgh plant. Several manufacturers were also given the benefit of the data arrived at by the Bureau, and during the following two years pioneer work of great value was done.

The making of optical glass is no easy matter. The pots in which the ingredients, carefully selected as regards purity, are melted presented a knotty problem. Melting glass must be thoroughly stirred to make it as homogeneous as possible. The stirring rod itself, and even a small portion of the inner surface of the pot will dissolve in the glass, and naturally these pots must be made of a substance which will not color or stain the glass. One of the big problems, therefore, which confronted the Bureau was the finding of a suitable refractory material for the pots. After much careful experimenting, the waste bisque of whiteware potteries was decided on, and while formerly it took a long time to

make a pot by hand, a casting method was perfected which cut down the time to three weeks.

In process of manufacture, of course, the melted ingredients of the glass undergo a long and perfect cooling, which in some cases extends to months. Then the pot is broken from around the glass. The utmost care cannot prevent the contamination of that surface of the glass that has been in contact with the surface of the pot, and accordingly sometimes only as much as 20 per cent. of the glass block is available for use.

The Bureau to-day is still experimenting on pots that will give even better results.

However, when the United States entered the war, considerable progress had been made. The Bausch and Lomb Company, Keuffel and Esser, the Pittsburgh Plate Glass Company, and the Spencer Lens Company were among the companies engaged in turning out considerable quantities of excellent glass, while the Bureau in its own plant was manufacturing glass equal to any made in Europe. Then came the demand for increased production to satisfy the immediate needs of the army and navy for optical glass for binoculars, gun-sights, range finders, tank sights, bore-sighting devices, periscopes, airplane cameras, bombing sights, and so on. The Bureau of Standards at once enlarged its Pittsburgh plant, and the manufacturers provided added facilities, receiving invaluable advice from the Bureau experts and those provided by the Geophysical Laboratory of the Carnegie Institution. The total production quickly reached twenty tons per month, and at the time the armistice was signed, the Bureau plant at Pittsburgh was alone turning out two tons per month.

To-day, highly profitable experiments are being continued in the extensive laboratories of the Bureau at Washington. The samples of optical glass on view there speak for themselves. America is making as good optical glass as that of any foreign firm. But there is at present little profit in the industry, so in that respect it loses

its attractiveness for the private manufacturer. One or two firms, which, actuated by a high patriotic impulse, manufactured the glass during the war, have ceased to make it. At least two firms, however, will continue its manufacture. The optical glass industry will never be permitted to slide back to a foreign monopoly. The only problem to be solved is that of cheaper production here to compete with foreign concerns on a large commercial scale. This the Bureau will not be long in solving.

The Manufacture of Nautical Clocks

Yet another phase of the Bureau's activity concerns ships' timepieces, practically all of which, before the war, came from England. The ravages of the submarine war and the necessity of filling her own wants, naturally cut off America's supply of nautical clocks, and, when the Emergency Fleet Corporation began to turn out ships by the score, the need for reliable timepieces was great.

Once again the Bureau of Standards jumped into the breach. Several firms were given the benefit of its expert advice, and they were quick to enter into the manufacture of finely-adjusted, large-size watches, which, set in regular gimbals, have taken the place of the familiar ship's clock. Row after row of clocks—thousands of them—may be seen at the Bureau, all being checked with a degree of accuracy which speaks volumes for the fineness of the work put into them. America will never again be dependent on England for her ships' clocks, or, as they are now, ships' watches.

It will thus be seen that the war awakened the American manufacturer to a realization of what a Bureau of Standards could accomplish. Its researches have not ended with the conclusion of hostilities. Door after door in the commercial and industrial world will be opened by the home manufacturer with keys supplied by the Bureau of Standards at Washington, D.C.

Canadian Machinery Drafting Course--Part II

In This Second Portion We Go Still Further Into the Use of the Drawing Instruments, and Discuss the Various Type of Lines as Adopted in General Drafting Practice

By J. H. MOORE, Associate Editor Canadian Machinery

BEFORE commencing on the second part of this course, how about the first instalment? Did you study it up and derive any benefit from the same? What is equally important is this: have you sent us in a sample of your work? Remember the three prizes each issue, so get busy, if you have so far hesitated at sending your work along, for it might be your plate that will land a prize.

In Part 1 we touched on the very simple uses of the drawing board, T-square, and triangles. Plate No. 1 was simply a test to see if instructions had been followed, so now let us go still further into the various other instruments, as required in the art of mechanical drawing.

The Scale

Fig. 1 illustrates a very popular type of scale as used in drafting work. These scales are usually constructed of box-wood, and are made in a triangular section as shown. Usually they are graduated for a distance of 12 inches. The type illustrated has six surfaces for dif-

ferent graduations, and the scales are so arranged that the drawings may be made in any proportion to the actual size. For general mechanical work the common divisions are multiples of two, thus drawings are made full size, 1/2 size, 1/4 size, 1/8 size, 1-16 size, etc., etc. Should a drawing be half size, of course 6 inches would then equal 1 foot, while if 1/8 scale is desired, 1 1/2 inches equals 1 foot. The scale is provided with all these necessary graduations, and the student is advised to study his scale and

type, with beveled edge, but as the divisions on these scales are similar to the triangular type we need not discuss the scales question further. For the present, all drawings will be made full size, so students have ample time to familiarize themselves with the use of their scale.

The Protractor

Fig. 2 illustrates the instrument known as a protractor. This tool is used for laying off and measuring angles and is usually made of steel, brass, cel-

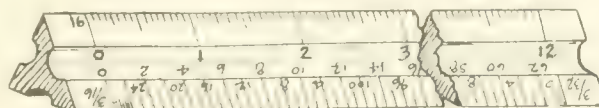


FIG. 1. GENERAL VIEW OF TRIANGULAR SCALE.

becomes acquainted with the graduations of his scales and how to use them, for later on in the course this will become a necessity.

Another very handy scale is the flat

luloid, or sometimes paper, but the latter is not to be recommended, as it soon becomes worn and is not to be depended upon for accuracy. For general use in this course, either of the first three

stated will do, with the celluloid the favorite. If made of metal the instrument is cut away as shown in sketch, in order to allow the worker to see his drawing, while if made of celluloid the piece is solid, for the instrument is transparent, a decided advantage over the metal type. In all cases, however, the outer edge is divided into degrees, and tenths of degrees. Perhaps it would be best to sort of jack up readers' minds to the fact that there are 360 degrees in a complete circle, therefore 180 degrees to a half circle. The protractor is laid out in such a manner as to read from 0 to 90 degrees, then reverse, while in some cases both values are stamped on the instrument, as for example, opposite 70 degrees would be also stamped 110, for one would be the component of the other. To prove this in a simple manner for the reader's benefit, let us first take the 70 degree mark. This is 20 degrees less than 90, so in placing the component we must first take the 90 plus the 20, making 110, or the other marking.

To lay off a required angle, use a very hard and carefully sharpened pencil. Place the protractor so that the two zero marks are on the given line and the centre point marked A on sketch is at the point through which the desired

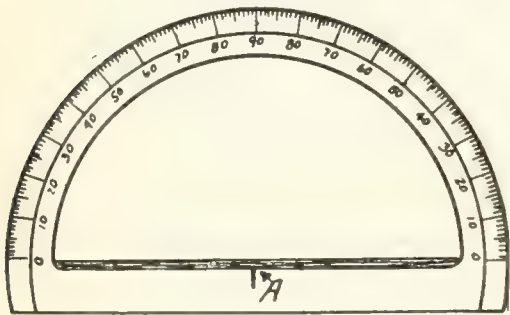


FIG 2

FIG. 2—ONE STYLE OF PROTRACTOR.

line is to be drawn. Mark a point at the degree desired, mark your centre point and draw your line, which will then be at the desired angle from the horizontal.

Irregular Curve

Perhaps as convenient a tool as the draftsman uses is that known as an irregular curve. This peculiar shaped instrument is sometimes called a French curve, but is generally known as an irregular curve. It is used for drawing curves other than arcs of a circle, with either pen or pencil. These tools are made of wood, hard rubber or celluloid, and once more the celluloid is the better owing to its transparency. Any curve drawn by such means is usually termed a freehand curve.

At all times try and get your curve to pass through at least three dots, or points as they are usually called, of the line desired, for a much smoother curved line will be the result. Usually it is good practice to first pencil the line in lightly, then ink it over. In inking in, it is most important that the blades of

the pen be kept tangent with the curve, otherwise there is a tendency to blot the work. Later on in the course students will find they require to use this tool, but for the present, at least, they will not be called upon to use it.

Compass, Dividers and Pen

Fig. 4 illustrates the instruments more used than any others, with, perhaps, the

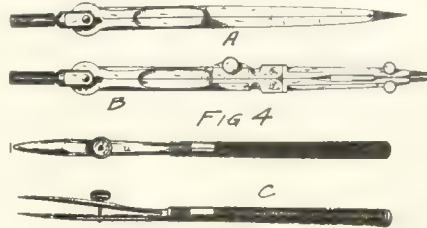


FIG. 4—SOME OF THE VARIOUS INSTRUMENTS USED.

exception of the T-square. At A is shown the dividers, used in laying off distances on the drawing, either from the scale or other parts of the drawing. They are also used to divide a line into equal parts. In fact their use becomes more and more general as the student becomes accustomed to them.

B illustrates the compass, used in drawing circles and arcs of circles. One leg of these compasses has, as readers will notice, a screw which loosens and allows one leg, usually the pencil point, to come out from the lower half, and the pen point or extra length bar to go in its place. By this means the one main body can be used as a pencil compass, or pen compass, simply by interchanging, while by adding the extra length bar, you enlarge the capacity of the instrument, for this bar has also a hole in it to accommodate either the pencil or the pen. From constant practice with this instrument comes a knowledge far better than written instruction can ever give the student. About as easy a method of holding the compass is this. Never use both hands, but learn to handle the instruments easily by one hand.

The pen as shown at C illustrates both views clearly, first as it looks from the top, and secondly as it appears from the side when open. This pen is used for drawing straight lines, or curves that are not arcs of circles. Commonly it is simply termed the ruling pen. The distance between the pen points is adjustable by means of a little thumbscrew as shown. The blades are given a slight curvature, so that there will be a cavity for ink, even when the pen points are very close together. The pen should not be dipped in the ink, but should be filled by means of the quill, which forms a part of the cork on practically all India ink bottles. Do not attempt to place too much ink in the pen at once, about $\frac{1}{4}$ to $\frac{3}{8}$ in. will be found sufficient. Upon finishing your work always take a cloth and wipe carefully both blades of the pen, as all liquid inks corrode the blades if allowed to dry, and no good work can be done with a poorly-kept

pen, so students will do well to remember this point throughout the course.

In using the pen be sure that both blades bear evenly on the paper, in order that the resulting line be smooth and even. Study the chart at Fig. 6. A and B illustrate a common danger, namely, first too great a slope outward, and second too great a slope inward. Either one is wrong, and must be avoided if good work is to be obtained. C illustrates the correct method, namely, keep your pen blades as vertical as possible. At Fig. 7 is shown another view of using the pen, and students cannot do better than to study carefully these two views, and practise inking until a good, straight, clear line can always be obtained. Don't be hasty to blame the pen, ink or paper; be sure it's not the operator. A little time spent in this practice work will be time well spent. The other remaining instruments are the bow pencil, dividers, and pen, so called because of their bow construction. These tools are used for smaller and finer work, and are especially adapted for circles having a radius of less than $\frac{3}{4}$ inch, but their use and manner of using are practically the same. Fig. 8 illustrates a typical set of good quality instruments, together with case. Students need not purchase such an elaborate set as shown unless they so desire. For general work in this course a cheaper set will do equally as well. The only reason for showing

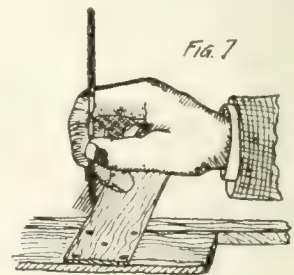


FIG. 7 THE CORRECT WAY TO HOLD THE PEN.

such a set is to illustrate the class of tools used in the regular drafting business.

Some Triangle Problems

Now that we have gone into the various instruments as used, let us go a little further into the use of the triangles, as started in Part 1. We have so far made 45, 60 and 30 degree lines with these tools, but they have a much wider use, as illustrated in Figs. 9 to 14. Let us consider them in sequence.

Fig. 9 illustrates a very common use, namely, drawing parallel lines at an angle to the horizontal, by means of the T-square and triangle. Fig. 10 illustrates the use of triangles only, and shows the method of drawing a line parallel to a given line. First place triangle A with one edge coinciding with the given line B C. Now take triangle D and place one of its edges in contact with the bottom edge of triangle A as shown. Hold triangle D firmly with the left hand and slide triangle A to the right or left as desired, until you reach the point through which you wish to draw the line E F.

Fig. 11 shows clearly that by combining the 45 and 60-30 triangles with T-square, you can procure angles of 15 or 75 degrees.

Fig. 12 illustrates the drawing of a rectangle by means of triangle and T-square. First draw, by means of T-square, lines A, B, C and D. Now use your triangle and draw vertical lines CA and BD, when rectangle will be complete.

Fig. 13 illustrates another method of drawing a rectangle by means of triangles only. Place your 60-30 degree triangle A as shown at whatever angle you desire, then place your 45 degree triangle B on top of same in manner shown. In the dotted position you can draw in the short sides, while in the heavy position you can finish up the longer sides.

Fig. 14 illustrates the method of drawing perpendicular lines on given lines, by means of T-square and triangles. Either combination can be used and both are used for illustrative purposes. From these six illustrations students can get some idea of the T-square and triangle possibilities. By constant practice they will find that these tools become more and more useful as time goes on.

Lines

So far we have only discussed full lines, but now let us go into the matter deeper and find out just what type of lines are commonly used in drawing practice. Refer to Fig. 15 and follow the lines as they are marked, A, B, etc. A represents what is known as the full line, and is the most common of all. B illustrates two different types of dimension lines, each of which is permissible. C shows the dotted or hidden line, which is used to designate a line hidden from view. D is known as a

construction line, and is used in various places, such as joining together two views, or projecting across from one view to another, which gives them their name, construction lines, but the name is all we wish you to get at present, for

subject in order to give students practice in the following plate, on the various lines. We wish you to memorize the names, so that when the discussion on their uses comes later, it will be that much easier for students to follow.

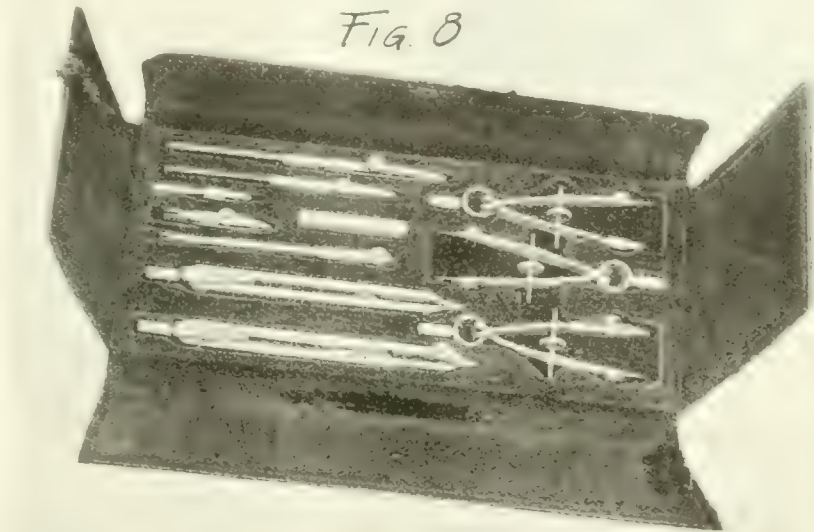


FIG. 8. TYPICAL SET OF INSTRUMENTS

its application will be fully explained later in the series. E illustrates the centre line, which resembles the construction line, but it will be noticed that two dots in place of one go between each long dash. This line and its uses will be discussed fully later. F shows what is known as a border line. This line is similar to the full line, but twice its thickness. We only touch on this line

Now since we have covered so much ground in this second part let us close it by instructions for plate No. 2.

Draw border lines as before, 9x13, and trimming lines, 9½x13½, and divide sheet into four sections. Note dimensions and work to these. Study the plate carefully, for all the various lines spoken of in this article are worked in on the practice plate. Draw everything to di-

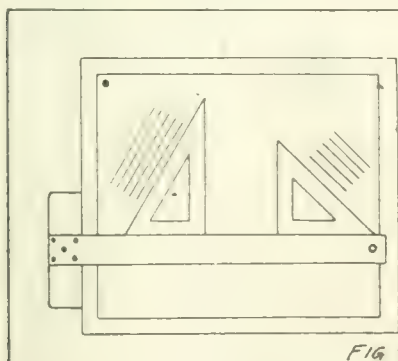


FIG 9

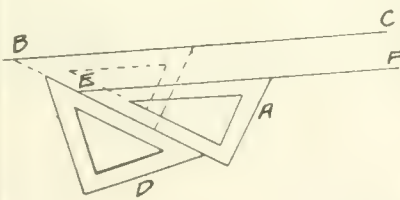


FIG 10

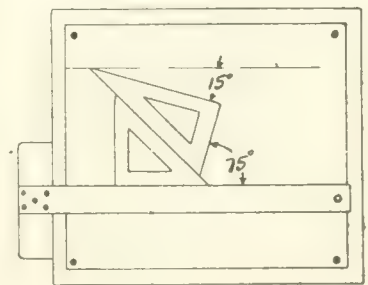


FIG 11

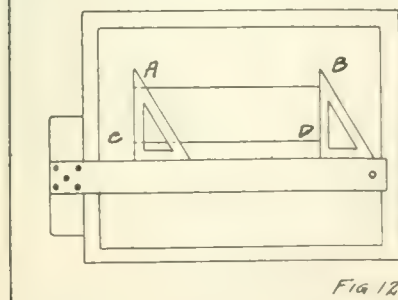


FIG 12

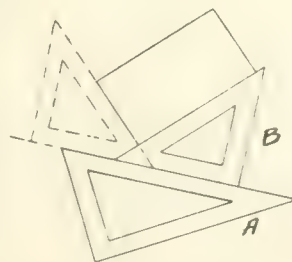


FIG 13

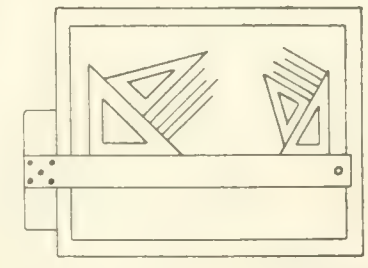


FIG 14

mensions. In drawing the dotted lines, make each dot about 1-16 in. long and allow 1-16 in. space between each dot. For the other type of lines study the plate. First draw the lines lightly in pencil, then ink in afterwards. Higgins' black waterproof India ink is as good as any. Be careful not to make your pencil line too heavy, otherwise your inked lines will not be as clear. After completing the plate, write on a separate sheet the style of lines marked A, B, C, D, E, F, at Fig. 1 on plate, also lines G, H, I, J, K, on Fig. 2, also on plate. The little f on Fig. 3 denotes that surfaces are finished but the only reason we placed them on drawing is to familiarize students with their use, for later this point will be fully gone into.

Above all take care to make your plate as neat as possible. Remember we have three scales for the three best plates

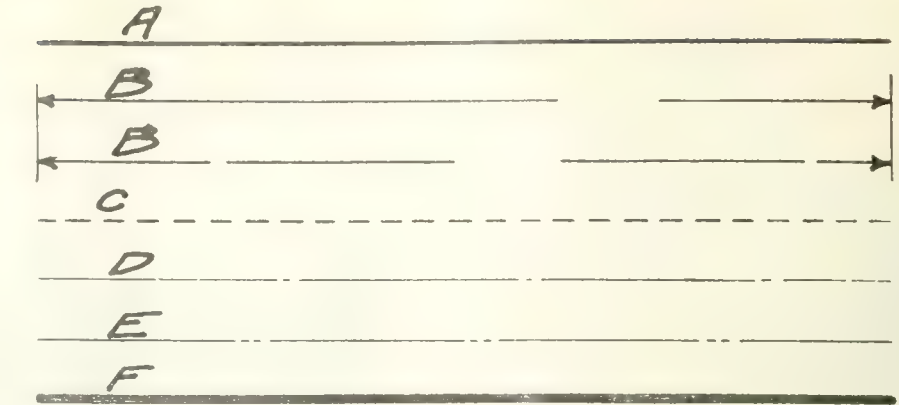


FIG. 15—VARIOUS STYLE LINES AS USUALLY ADOPTED.

received. These scales retail at \$1.25, so stick to it and send your work along, so that you are in shape to tackle

the next section and plate No. 3 in the next issue.

(See coupon to fill in on page 368)

<p style="text-align: center;">FIG. 1</p>	<p style="text-align: center;">FIG. 3</p>
<p style="text-align: center;">FIG. 2</p>	<p style="text-align: center;">FIG. 3</p>
<p>CANADIAN MACHINERY DRAFTING COURSE</p> <p>NAME _____ ADDRESS _____ PLATE No 2</p>	

LET US HAVE YOUR PLATE AS SOON AS POSSIBLE.

Is it Worth While Reading Technical Books

A Short Mythical Tale, Which All Should Read Regarding the
Writer's Views on the Above Subject. Read, Digest, Then Act
Upon, Would be Our Advice on the Matter

By I. M. TELLINGYOU

TO enter a subject of such a nature, we should, to be fair, show the two sides of the case, so for illustrative purposes, suppose we concoct two stories, which, while all imaginary, happen in a similar way every day in our daily grind.

We will first take the case of—well, let's say John Blank. We see him go through school fairly well. He never gives undue worry to his lessons. If they come all right—very well, then it's all jake as we would say. On the other hand, if he fails—well, he should worry.

John drifts along in this manner with no definite purpose in life, until time comes to leave school and go to work. "Now John," says his father, "what would you like to start at?" Ten chances to one John says, "I don't know, Dad, I never thought very much about it, etc., etc."

The upshot in quite a number of cases is that John either starts a trade which he does not like, or is not suited for, having no special preparation for the same, or on the other hand he does not start in a trade at all, but takes up some occupation easy to do (that is as far as brain power is concerned), and so he continues to drift.

Let us leave John for a while at this stage, and spend a little while studying Tom, his brother, who, by the way, is a year younger than John. Tom always was a joke in John's eyes, for when John would be out playing ball, or off to the show, Tom, like a ninny (using John's expression) stayed at home and read.

"What did he read?" you might be tempted to ask, when John would sneer and say, "Oh, some dry technical stuff, I don't know what it's all about, but Tom claims it will make him worth more money some day. Of course that's all bosh," was usually John's final thrust.

However, to continue with Tom. He goes to the same school as his brother, but passes in every class, owing to his earnest attention to lessons, combined with home study. Strange to say, Tom passes his classes faster than his older brother. And, when leaving school, is at the highest grade he can go in this type of day school.

In the meantime Tom has been reading "dry technical stuff" (as John expressed it) with a definite aim in view. He has also been going to manual training, and practically made up his mind what he wants to be.

His father does not even have to ask him, "Well, Tom, when do you think you'll start in work?" for they have had many a little chat together on the subject, and it is all settled. Tom goes to work with the same earnest spirit in which he tackled his school, and re-

sults begin to show themselves as the years go on.

To get back to John. He makes enough to live on, and have a fairly good time. Of course he saves nothing, but then "you can't save and spend," as he puts it.

Tom has finished his apprenticeship, and gets at last some real money, where before he was the laughing-stock of his brother for the small salary he was receiving. The night that he comes home with a tradesman's pay is a happy one for Tom, but not so hilarious a time for John. Tom's salary now has John's wage looking like thirty cents, and yet the end is not in sight.

Years go on, John asks for a raise and does not get it. Tom never asks for increases, yet seems to get them periodically. He is accused of standing in with the foreman, etc., etc., but he merely smiles and keeps on reading technical books in his spare time.

One day the foreman gets sick, and Tom takes his place. He tells the story without boast when he comes home. John pooh pooh's the idea, yet underneath it all he knows it is the truth.

He gets his brother up in the room alone, and starts in this manner: "Say, Tom, I don't believe those books helped you a darn bit—but are they hard to read?" Tom sees his opportunity, and realizes his brother is waking up at last, so he gives him a good strong lecture.

To be brief, we will pass over quite a few years. Tom is now superintendent, but Jack is also coming strong. The good stuff was in him, all it needed was bringing out, so you see the idea and moral of my little mythical tale is this: "That it's never too late to start in and learn. You often get to an age when going to school is out of the question—but you have always got a school in your home, if you pick out real up-to-the-minute technical books."

As one fellow who knows what he is talking about remarked to the writer:

"The educated man will always command the respect of the community in which he resides and has been of the greatest service in the development of modern civilization. It was not so far back in history when education was difficult to obtain, and only the wealthy could acquire knowledge. The worker could secure an education only under almost insurmountable difficulties. Not only were the schools few and inaccessible to those who did not live in large communities, but, owing to limited mail service and unsuitable text books, the average citizen found it difficult to acquire anything but a limited knowledge of the three 'Rs,' reading, 'riting, and 'rithmetic, as the old-timers used to say, in the country or city school.

"To-day there is no excuse for any reasonably intelligent person remaining ignorant of any art or science in which he or she is interested. Numerous text books, written by experts, deal with technical subjects in simple, understandable English, and some treat of real scientific matters without using higher mathematics or 'dead' languages.

"If one compares the semi-technical or mechanical book of to-day with those published even a decade ago, a great improvement in the character of material, quality and number of illustrations and logical arrangement of subject matter will be evident. In modern books dealing with mechanics, simplicity of exposition and clarity of reasoning is aimed for rather than strictly literary merit as exemplified by complex phrases. The semi-technical or home study books are the most difficult of any to write, and there are comparatively few writers who can simplify technical facts without sacrifice of accuracy of description. Compared to stories and novels, technical and mechanical books are difficult to prepare. The former are usually the result of an active imagination, and are short-lived; the latter call for much study and research on the part of the writer and courage on the part of the publisher, because of the expense involved in their production and slower sale. Hundreds of costly special drawings and photographs must be used to illustrate the text, whereas the story books seldom have more than a dozen or so.

"Publishing good and really useful mechanical and technical text books calls for experience that can only come through a long and well-established business, because it takes time to gauge the public demand and prepare books to meet it. Naturally, the best books are those produced by the oldest houses, because they command the services of the best editors and writers, and can produce books of the greatest value to the mechanic or student desiring instruction.

"It is not generally known that any mechanic can secure a comprehensive review of the theory and practice of his trade, either in its broad entirety or in any of its specialized phases for about the price of the average theatre ticket, and a week's pay will buy a set of mechanical books that cost over a quarter of a million dollars to prepare and publish, and that embody the elements of a complete three or four years' college course, boiled down to solid facts and presented in interesting, understandable language.

"The ambitious man of to-day is seeking more education, not only in his own line but those related to it. Those who

learn more invariably earn more. A man who has the courage to study good books after working hours to increase his knowledge possesses the main quality to secure success. He is the one who is able to seize an opportunity when it presents itself, and home study is what makes the apprentice or journeyman of to-day the shop foreman, manager, or owner of to-morrow. One must read consistently to keep up with the marked progress in the mechanical field. Not only must he keep posted on current progress of his trade by studying trade papers, but he should have good books of reference constantly available to know what has been done and why, as well as the possible developments of the future."

The writer personally agrees with every word of this gentleman's opinion regarding technical books, and can only add: Study first the company from which you purchase your material. Make sure they are in a position to supply you with up-to-date material in order to keep you up-to-date.

"Where shall I write to, and what shall I write for?" some readers might inquire. Well, that is a difficult question to answer. We first of all would not state any particular house to write to, but leave that to your own discretion, and cannot advise you exactly what book to write for, as we do not know the subject which you wish a book upon. We can, however, advise you to write for catalogues, and pick out the subjects you wish to study.

This is the common sense way of doing things. First make up your mind what you want to study. Next pick from catalogues the books you want, and last but not least, when you get them, see that you study them closely and do both the books and yourself justice.

For readers' benefit, and through the courtesy of the Norman W. Henley Publishing Co., 2, 4, 6 West 45th Street, New York, we are able to conclude this article with a review on eight books, on eight entirely different subjects published by this firm. In this way we no doubt will appeal to all readers' taste in at least one of these books. Our reviews cannot be of undue length owing to lack of space, but we will give readers at least a list of contents, together with our views on these books.

First let us start with a book entitled, "**Compressed Air And Its Applications**" By G. D. Hiscox, M.E.

This book has 665 pages, 35 chapters, over 500 illustrations, and could be well called an encyclopedia on the subject of compressed air. It is written by a man who is an expert in his line. He has dealt with the subject very thoroughly. The physical properties of air; motion of air and its force; pressures below atmospheric; the flow of air under pressure from orifices into the atmosphere; the power of the wind; isotherms; compression and expansion of air; thermodynamics; adiabatic compression and expansion; the compressed air indicator card; actual work of compressor. Multi stage air compression; ex-

pansion of compressed air, and the work of the motor; transmission of power by compressed air; compressed air reheating and its work; the compressed air motor; efficiency of air compressors at high altitudes; air compressors; compressed air in mining and quarrying; pneumatic tools in all phases; compressed air in railway service; pneumatic work; pneumatic tube transmission; compressed air in warfare; compressed air work; refrigeration; the hygiene of compressed air; later developments in air work, and last but not least, a list of patents from 1875 to July 1, 1908. Readers can readily see that this book is a detailed study of the subject, and well worth the \$6 which is the publisher's price. Anyone interested in compressed air can safely depend on this book.

"Punches, Dies and Tools, For Manufacturing in Presses"

By J. V. Woodworth, M.E.

Here is a book for all practical men interested in the working of sheet metal. It consists of 483 pages, is well illustrated with sketches, etc., and sells at the publisher's price of \$4.50. The subjects of die making; punch making; die sinking; sheet metal working and making of special tools; devices and mechanical combinations for piercing, punching, cutting, bending, forming, drawing, compressing, embossing, forging, and assembling metal parts. It also includes articles of other materials in various machine tools. The making of cartridge shells; wire and bar steel drawing dies; tools for paint and chemical tablets; pens; pins and needles; jewelry; eye-glass; spoon and fork making dies are also included. Subpress dies for watches, and clock dies also form part of this book, together with drop dies of various descriptions. In other words an ideal book for those interested in die work.

Books on Gearing

To those interested in gearing, we can safely recommend the following gear change devices by D. E. Perrizo, M.E. This book sells for \$1.25, and describes and illustrates the development of the screw-cutting lathe, and the United States patents upon the methods for obtaining various pitches of screw threads. The engravings are made from the records of the United States Patent Office. The book contains 101 pages, and covers the subject very thoroughly. This book is especially adapted for draftsmen, de-

signers, would-be inventors, in fact anyone interested in gearing.

The next gear book to be mentioned is "Bevel Gear Tables," by D. A. G. Engstrom. This book of 66 pages also sells at \$1.25, and contains a collection of tables with necessary explanation to enable anyone to figure bevel gears without the use of trigonometry. Anyone interested in bevel gears should read this book. Of course the draftsman and designer will be specially interested, but machinists also will find much to their interest.

Inventors' Manual

To readers with the inventive mind, we can refer them to the "Inventors' Manual, And How to Make a Patent Pay," by G. M. Hopkins, and revised by A. A. Hopkins. There are 133 pages in this book, with examples of mechanical and design patents at the back, in addition to regular reading matter. The usual pitfalls are pointed out, which the unwary get into, and the book is really a guide for inventors in patenting, perfecting, and disposing of their ideas. This book also sells for \$1.25, and to anyone contemplating placing an invention is a worth-while investment.

Mechanical Movements

As a summing up, we refer readers in general to two books by G. D. Hiscox, M.E., entitled, "Mechanical Movements, Powers and Devices," and "Mechanical Appliances, Movements and Novelties of Construction."

These two books need no introduction to some readers who are well aware of their contents, but to the readers not familiar with these works, let the writer state, that almost every believable movement is described and illustrated. Any inventor, designer of machinery, in fact anyone interested in mechanical movements, should have a copy of each of these books. The writer, who is a designer himself, found them invaluable for his work. Here are two volumes that go forward with the best words that I can possibly speak for them. They sell at \$3 each, and are worth every cent of it.

It is to be hoped that readers, after reading this article, have become convinced that technical books do aid you to bigger and better things, and now, since the winter evenings are drawing nigh, what better resolution could one make than say to themselves: "Starting now, I'm going to look into the possibilities of technical literature."

Tear off and send with drawing

Name

Address

Position

Firm's name.....

Shop Arithmetic—Wheel and Pulley Problems

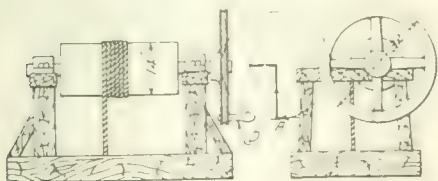
Part 12 of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade. Calculations Dealing With Wheels and Pulleys Are Covered in the Present Lesson

By J. H. RODGERS, Associate Editor Canadian Machinery

IN a previous lesson it was stated that a large percentage of mechanical movements was based on the principle of the simple lever action, modified or adapted for specific purposes. This is clearly illustrated in the practical application of brake beams, rocker arms, trip hammers, safety valve levers, etc. The same is equally true in respect to wheels and pulleys, but the direct action is not so evident owing to the continuous movement in the one direction. To make the student more familiar with the evolution of the wheel and axle, and show the relative connection between it and the lever, the sketch below is given.



The transition from the lever to the windlass is quite clear, and the mechanical advantage of the continuous movement is immediately recognized. The sketch in the centre shows the skeleton lever in the same position as the windlass. In raising the weight the force applied is exerted at the point A, or the extreme end of the lever, and is operating at maximum efficiency when at right angles to the direction of travel, or tangent to the circle through which the outer end of the lever moves. The crank C, is the power arm, the handle D being attached to facilitate the operation. The radius of the drum E is the length of the weight arm, but owing to the vertical pull of the rope or cable, the position of the lever may be considered as being always horizontal. Suppose now that the crank is removed and replaced with a wheel, as shown below, there is evidently no material change in the action of the mechanism.

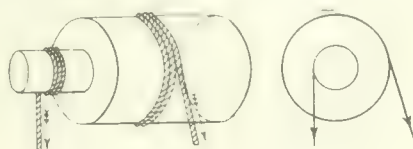


With the dimensions as given above, and neglecting the power required to overcome friction, what weight could be raised by an applied force on the handle of 100 lbs.? Using the ratio of: the power applied is to the weight lifted, as the weight arm is to the power arm.

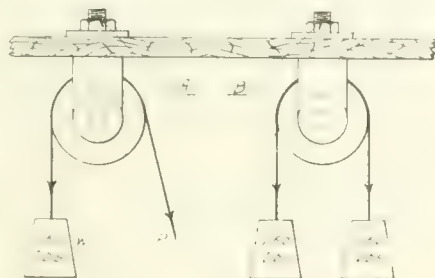
$$P \times W = W_2 \times L_2$$

$$W = \frac{P \times L_2}{L_1} = \frac{100 \times 12}{4} = 300 \text{ lbs.}$$

In the above example it was shown that the force required to raise the weight had to be exerted in a circular manner. With a man turning a crank of this description it is usually a very difficult task to maintain the applied force in a tangential direction, owing to the continual changing position of his arms and body, so that it will invariably be found that much of his strength is wasted, and the effective pull reduced. The one direction, steady pull, therefore, is the best where weights must be lifted through considerable distance. An arrangement of this kind is shown below, together with the leverage diagram from which the action is derived.



In the last lesson a few abstract examples were given to illustrate the connection between the lever and the pulley. We will now go into the subject more fully and demonstrate where the knowledge of figures is of considerable advantage in determining those factors underlying the practical use of such devices as pulleys and chain blocks, belting, gearing, etc. When a rope is passed over a single pulley riding in a bracket, secured to some overhead support, it has been shown that the pull required to balance the weight must be equal to it. This is quite clear from the sketch below.

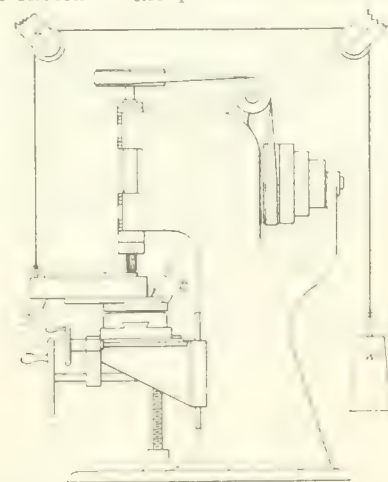


To some of the younger mechanics it might appear that the stress on the bolt supporting the pulley would equal the weight W, but a little study of the conditions will convince one that the stress will be equal to twice the weight; in other words, equal to the weight supported plus the pull required to balance the weight. This is quite evident from the right hand figure, where the pull is replaced by a weight sufficient to maintain equilibrium. The rope or cable in this case is under uniform tension of 150 lbs., but the tension on the bolts A and B is 300 lbs.

This question of rope strain is one that frequently occasions considerable controversy, among shop men, regarding the actual tension upon the rope when loaded. The difference of opinion invariably arises from lack of sufficient knowledge respecting the fundamental principles of forces in action.

To fully understand the question of rope stresses it is necessary to become familiar with the third law of motion, namely, "action and reaction are equal and opposite"; that is to say, when a force is applied a corresponding force is exerted in the opposite direction. Therefore, irrespective of how the reaction operates, it must be understood that the stress in the rope can only equal the force or power applied. This applies, not only to single ropes under direct pull, but to all individual or multiple systems. In the case of multiple block tackle, where the force applied is, say 100 lbs., this stress will be equal throughout the entire rope, with slight variation due to the additional strain resulting from friction of the moving parts.

A practical example of this character was experienced by the writer some years ago, which created considerable discussion at the time, as to the tension existing in different sections of the rope. A sketch of the problem is shown here.



This shows an arrangement provided to balance the overhanging weight of a large die, while the latter was being milled on a small vertical milling machine. Several problems presented themselves, which gave rise to no little discussion among them men in the shop; those pertaining to the strain upon the different sections of the rope, and also to the pull upon the hangers H, H, when the weight was supported in different ways. The operations on the casting A, were such that considerably over half of it would extend over the edge of the

The Continued Supremacy of Cast Iron

By DONALD H. HAMPSON

WE hear a great deal these days about new metals and alloys, and we very nearly get the idea that the big five (cast iron, wrought iron, brass, bronze, and steel) of our fathers' days have been superseded. Twenty-five years ago, the metallurgist and the chemist and the mixers of metals had not come to the front with the bewildering variety that is offered to-day. From the reading of magazine articles and advertisements and from association with automobiles, the lay public has picked up considerable general information about materials—information which leads them to believe that every metal part that is worth while must be made of "alloys or special metals." And this is true to a lesser degree with many men in the mechanical branches—due largely to nicely worded statements of enthusiastic salesmen.

But to a greater extent than is realized at first thought, one of the "superseded" metals holds its own, in fact, is making new friends all the time. That metal is cast iron. Plain, ordinary grey iron—the cheapest of all the metals and the most adaptable. If you want a section only one-sixteenth thick or if you want a part that weighs twenty tons you can make it of cast iron and know pretty well beforehand that you can get it anywhere, any time, and that it will be just what you want.

"The bigger they come, the harder they fall," is a truism of the prize ring and it applies quite nicely to some of the vaunted substitutes for cast iron.

Take the aluminum piston for automobile engines, for example. It was going to revolutionize the business, but how many men who are in the class that has to look after their own cars will buy another car with aluminum pistons? There's an occasional exception, but it is back to the good old cast iron piston for theirs next time. Sold under various trade names, these men have found that the slight gain in weight and higher engine speed were accompanied by a loss of power unless the engine was over-hot and that the cylinder walls were saved at the expense of the pistons. Aside from the necessary sloppy fit in the bore, the wrist pins have a disagreeable habit of wearing or working loose so much sooner. It is back to the cast iron piston and a little slower speeded engine for these men who have tried.

The die casting gave poor old grey iron quite a shove to the wall. But recently, there has been a marked tendency to return to the sand cast product, especially for parts that are subject to any wear or pressure. Of course the iron casting does not begin to have the appearance of the accuracy that the die casting does.

It is the permanentness of cast iron and its superior wearing quality that make it a more value than mere shape in the beginning.

Aluminum and die cast products made deep inroads in the printing business a few years ago when the market was flooded with the white metal "furniture" and plate mounting bases; these pieces were originally of wood or lead, but as the art progressed and modern machinery came in, cast iron replaced these two—to be followed by the die cast parts, that could be made of the required accuracy at a far lesser cost than cast iron. Actual usage throughout a period of years, however, showed that the white metal changed its size under printing pressures almost as easily as had the lead and that the boasted "stronger than cast iron" could not be realized. One supply house states that they would be half a million ahead to-day if they had left the other alone and stuck to the cast iron.

It is frequently stated that cast iron makes a good bearing surface for any shaft from the slowly revolving one up to a saw mandrel, yet we do not see many such because the average builder is wedded to the use of some bearing material. Two cases showing how good it is will be noted.

There are in a certain shop sixteen 2 in. milling machine spindles made of ordinary soft steel and running directly in cast iron of the headstock. These were made in 1902-1903 and were intended for using the carbon steel cutters of that day. With the general introduction of high speed steel, the machines were speeded up and as the steel bettered, more speeding up was done to keep the steel working right up to the "book speed." Just plain oil hole lubrication and ordinary operators—and not a case of re-fitting in all that time, though the work must always be "plus or minus, not over 0.000½ in." And the writer made and fitted a quantity of ¾ in. cast iron bearings over eleven years ago for which the factory has never had an enquiry for replacements in spite of the fact that the shafts in them run at 14,000 R. P. M.

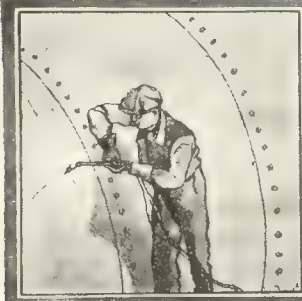
Then there is the case of the car wheel. At one time we were led to believe that the paper wheel was going to open up an era of silent, smooth running calculated to please the elect. Yet there are none of those paper wheels in use to-day and there are millions of the old-fashioned cast iron wheels rolling along smoothly and with a satisfactory degree of silence. Even the steel wheel has not made such deep inroads in the iron wheel business—not even when you can get cast iron chilled wheels that will do 80,000 miles or more and at a first cost of four cents a pound, even in these days of high prices.

Every factory has to use shafting, including pulleys and hangers. These latter items were once made exclusively of cast iron but the last two decades have witnessed the advent of pressed steel hangers and pulleys—parts which certainly are modern, light, neat, and almost indestructible. Yet if one circulates among the actual users of these products, there is found an undercurrent of reaction; one man tells you that a cast iron pulley or hanger "stays there" after it is made; another complains about the cast iron parts that are riveted or bolted in the steel structure and work loose; another machinist invites you to look at the "round" steel pulley he has in the lathe for boring, adding that if he took a cut ever it to make it round it would cut through at two points; and still another man beckons you to the scales to compare the weight of the steel product with well designed cast iron pulleys and hangers, pointing out triumphantly that the difference is hardly over five per cent.

In some automobiles we find gear cases of cast iron. The mechanic delights to work on such a car because he knows that the case isn't warped or sprung, that unless it has been cracked it is as accurate as on the day it was machined, that a touch with a hammer or a slip of a wrench will not bruise a surface to the point of inaccuracy that may escape the less trained eye of his helper.

All the metals used as substitutes for cast iron have their places—and the business could not get along now without them—but the selling talk that a competitor uses cast iron "because it is cheap, we use gold aluminum alloy" does not go as it once did and it seldom goes for re-orders. Grey iron has come out of the woods triumphant because it retains its size and shape, because it is one of the best wearing substances known, and because it can be given any reasonable form and at a cost that is not prohibitive.

Among the recent electro-therapeutic devices introduced to the public is an electric brush which, instead of being supplied current from a battery in the usual fashion, contains its own source of power. Leaving aside the therapeutic qualities of the electric brush, the present device is of immediate interest because of its electrical features. It contains a small generator which is capable of delivering currents of infinitesimal amperage, but at potentials of from 50 to 200 volts. The generator is driven by pressing a lever beside the handle, which lever operates through a chain of gears.



WELDING AND CUTTING



Oxy-Acetylene and the Safety First Movement

By A. CRESSY MORRISON, Sec. International Acetylene Association

An address delivered before the Western Pennsylvania Division of the National Safety Council.

MR. President and gentlemen of council:

Your president, with characteristic courtesy has, I fear, given you a somewhat too enthusiastic statement of my qualifications, in using the word "expert" and "authority." I must, therefore, as a preliminary, protest that I am neither an expert nor an authority, as these words will perhaps be interpreted by you in the light of your practical experience in the oxy-acetylene art.

I have, however, been closely associated with the safety rules and regulations governing the acetylene industry for many years, even before the first welding and cutting torches were used in this country. I have participated in the formulation of these regulations and have had an opportunity to observe the results of their application, but I have very much to learn from your practical experience in the actual use of the torch. I long ago became aware of the fact that it is impossible for anyone to be a real expert or an authority in any field without having personally undertaken practical work himself.

In approaching the subject which has been assigned to me, I am sure you will permit a moment's generalization. I am impressed by the fact that the Safety First Movement has become a factor in industry so late in the history of human endeavor. Our attention has recently been called to the interesting coincidence that the armistice became effective on the eleventh hour of the eleventh day of the eleventh month. Viewed in the light of the many thousand years during which human hands have wrought, it must be admitted that the Safety First movement, as expressed by such a splendid gathering of practical business men, is an eleventh hour movement. Eleventh hour movements, as instanced by the armistice, are sometimes exceedingly effective, and so, the safety first movement, as evidenced by gatherings such as this, promises to be equally so.

The growing recognition of the brotherhood of man has found expression in

industry through a greater consideration for the life and limb of the employee and in a wider field in the recognition in a sociological sense of responsibility to those dependent on him.

Altruism in industry, while advancing with giant strides, has not yet reached the point where it will alone continuously sustain the very serious efforts which the members of this council are, with thousands of others, at the present moment putting forth for the benefit of the workers in their respective industries.

Fortunate, there is, supplemental to the idea of benevolence, but of vital importance in assuring permanence to the Safety First Movement, the growing recognition of the superb fact that effort put into this movement is highly profitable. Great as is the effort of the present, the Safety First Movement is therefore but in its beginning, but its permanence is further assured by the marvelous growth during the war of humanitarian ideas and a realization of mutual dependence coupled with a higher evaluation by the industries of the faithful employee.

The wise employer recognizes as a fundamental of complete success that the maintenance of the health, comfort and safety of the employees is of paramount importance. Permanent relations between the employer and the employee in good health means experienced service and highest efficiency for both. To me the Safety First Movement already presents a means of communication with the employee which has won his confidence and through which many of the problems of readjustment, which now cause anxiety, may be solved without the sometimes predicted industrial disturbances.

I have said these things to you, knowing you would pardon a slight digression from the subject of the hour that I might show you that knowledge of your great work is abroad in the land, and that those who observe your activities appreciate its importance and its sound philosophic basis.

In discussing the oxy-acetylene blow-pipe, my subject naturally divides itself into two parts—one part dealing with safety in relation to the manufacture and transportation of material and apparatus used in connection with the art of welding and cutting, which, of course, includes the containers. The other part deals with the use of these substances and mechanisms.

If I deal with the first part of the subject and show the efforts which have been put forth to place in the hands of your workmen a safe apparatus and pure elements in safe containers, we can, when we come to the discussion of the rules governing actual use, see to what extent existing codes need to be supplemented in order to protect your employees and the whole industry adequately. This, of course, is our aim.

I will begin with the substances themselves—calcium carbide, acetylene and oxygen.

Calcium Carbide

Calcium carbide became a commercial fact because of the discoveries of L. Willson, an electrical engineer at Spray, N. C., who used an electric furnace for the production of metallic calcium. He secured a melted mass of dark color, which, on cooling, became solid and brittle. The substance was not the material for which he was searching, and some of it was thrown into a neighboring stream, when it was discovered that a gas was being evolved. This gas, when ignited, gave off quantities of soot, showing that it was not hydrogen, but a rich hydro-carbon gas. Upon investigation this was found to be acetylene. Thus calcium carbide was first manufactured during the experiments at Spray which took place in 1892. From this small beginning, such a short time ago, has grown the manufacture of calcium carbide which now girdles the world, the quantity produced running into the hundreds of thousands of tons, and its usefulness in many fields has proved to be of surprising importance.

Calcium carbide is manufactured in

the electric furnace at a temperature of about 7,000 degrees Fahrenheit, the raw materials being lime and coke. The resultant substance, calcium carbide, is a true chemical combination of calcium and carbon. It is tapped from the furnace and cools into ingots which are broken in stone crushers, screened to size, and packed in steel drums. It is then ready for shipment.

Calcium carbide is not an explosive, is not inflammable, and is not affected by concussion. These facts are shown by the crushing operations through which it is reduced to marketable sizes, and by the fact that it has already been subjected to the highest temperature man is able to produce. It, therefore, will not burn; nor is it affected by any heat other than the electric furnace itself.

Calcium carbide is unaffected by any of the elements with which it comes in contact, save water. It will slake if left exposed to the air because there is sufficient moisture in all normal air to produce its slow disintegration. There is never enough moisture in the air to produce enough acetylene from calcium carbide to form an inflammable mixture of air and acetylene, and under ordinary conditions of exposure to air there can be no accumulation of acetylene because the carbide exhausts all of the moisture from the air in its vicinity and cannot get any more until the dry air and acetylene has passed on and fresh air has taken its place.

Calcium carbide, if exposed to water, instantly produces acetylene. The amount of acetylene produced by commercial calcium carbide varies with the conditions, but is usually more than 4½ cubic feet and not more than 5 cubic feet to the pound.

Calcium carbide is packed in Government-regulated lapped seamed steel drums with a double cover. These drums in vast quantities have withstood for many years the vicissitudes of transit, both on land and overseas. The steel drums have been subject with the contents of calcium carbide to fire and flood under all possible conditions of exposure, and the record is excellent. So good is the record, indeed, that calcium carbide, which was at one time regarded with anxiety, is now shipped freely everywhere and has been removed from its list of dangerous articles by the Interstate Commerce Commission, and even from its list of articles which were at one time classed as doubtful. The underwriters, in their regulations, stipulate only that calcium carbide shall be kept in a dry place above the ground, and that where quantities in excess of 600 pounds are stored in one place it shall be stored in a building used exclusively for such storage, or in a specially constructed generator house. I think it is safe to say, therefore, that calcium carbide, as delivered to you for use is completely safeguarded, and that if the simple suggestions put forth by the underwriters are followed, it need not be regarded as a hazard by you.

Acetylene

Acetylene, which has its commercial origin solely in calcium carbide, is a

hydro-carbon gas. It comes to you in two ways—one through its manufacture from calcium carbide by means of a mechanism known as an acetylene generator, and the other compressed into standard acetylene cylinders.

Acetylene found its first usefulness as a means of illumination. For this purpose acetylene generators were devised. From the beginning, the National Board of Fire Underwriters, the Underwriters' Laboratories, and upon its formation, the National Fire Protection Association, assumed jurisdiction. As experience developed, rules and regulations for the construction of acetylene generators were devised and revised. Inventive genius was called into play to evolve a proper burner by which acetylene, so rich in carbon, could be made to burn with a brilliant, steady flame.

Acetylene produced by means of an acetylene generator has most of the characteristics of other hydro-carbon gases. The mention of a few of these gases will be illustrative, for instance, coal gas, water gas, gasoline, etc. Acetylene, however, does not contain carbon-monoxide, which renders coal gas and water gas poisonous and may be breathed mixed with air without any detrimental physiological effect. Like the other hydro-carbon gases it burns to carbon-dioxide and water vapor so there are no fumes from acetylene and consequently no danger from the products of its combustion.

Acetylene will ignite when mixed with air, provided the acetylene reaches three per cent. and under normal conditions, does not exceed thirty-five or forty per cent. Its rather wide range of ignitability is sometimes emphasized, but the real question is how small a percentage mixed with air will ignite, and the question of how rich the mixture has to be before the flame will be extinguished may well be excluded.

The development of the use of acetylene for lighting is very extensive and increasing. Over 300,000 homes, especially those in isolated locations, are lighted with acetylene. Acetylene is the dominant means of illumination in the non-gaseous coal mines and metal mines of the United States. Perhaps 700,000 miners use acetylene, carrying individual miners' lamps on their caps whenever they enter the mines. A very extended use and one of great value is the illumination by acetylene of aids to navigation, beacons and buoys. Acetylene, with its brilliant rays literally covers the world where warning marine guides are necessary. Acetylene has a wide use in contractors' lights where high candle power is needed in outdoor work.

The knowledge of the production and the characteristics of acetylene acquired by the underwriters while the development and use of lighting mechanisms was taking place, laid the foundations for the properly safeguarded apparatus now used for the manufacture of acetylene for use in the oxy-acetylene blow-nipe. Mechanisms which have passed the underwriters are known as permitted generators. The cost to the manufacturer of an acetylene generator who de-

sires to submit his apparatus for approval by the underwriters is small, and experience has shown that the underwriters' standards are necessary. You need not be anxious regarding the generator provided you purchase of the several makes which have been passed upon by the underwriters, and then install it in accordance with the rules and regulations which have been very carefully developed from the long experience of the National Fire Protection Association and the better class of manufacturers. One of the best rules of safety engineers is to avoid any generator which has not been approved, although many cheap devices are being offered.

The simplicity of the reaction between carbide and water is such that a great many shop engineers feel confident that they can devise an acetylene generator. An engineer who is perfectly sure that an inexperienced theorist would be incapable of doing things which he does so well, often feels that he can undertake matters which perhaps require quite as much experience in another field, and that he will prove an exception. The expectation of the inexperienced engineer who thinks he can make an acetylene generator and avoid all hazards which experience has now properly safeguarded should not be relied upon by safety engineers. The manufacturer who will refuse to submit his generator to the impartial and very careful examination made by the underwriters should not be trusted by safety engineers. A man is properly safeguarded if he will purchase a first-class generator from a reputable manufacturer which is listed as having the approval of the underwriters.

Where acetylene is used from cylinders, the industry has, with the aid of the underwriters and the Interstate Commerce Commission, developed safety to an equally high degree. The acetylene cylinder which must be approved by the Interstate Commerce Commission and which has passed the rigid examination of the underwriters' laboratories, is something more than a steel enclosure in which the acetylene is confined. Many people do not understand that these cylinders are completely filled with a porous material, such as asbestos, which, when compressed into the cylinder vigorously still leaves a porosity equal to about 75 per cent. of the capacity of the cylinder. Acetylene could now be compressed into the cylinder, but the quantity which the cylinder would hold at the low pressure of 250 pounds, which is the limit fixed by the Interstate Commerce Commission would be very small. A means must, therefore, be devised to increase the capacity of the cylinder for acetylene, and this is accomplished in a most interesting way. Acetone, which is a liquid related to the wood alcohol family, has peculiar characteristics in relation to acetylene. It will, for each atmosphere of pressure, absorb twenty-five times its volume of acetylene. The asbestos in the cylinder is, therefore, saturated with acetone up to about 50 per cent. of its porosity, whereupon when acetylene is compressed into cylinders it is taken up by the acetone and this is

why 300 feet of acetylene is compressed into an acetylene cylinder at 250 pounds pressure, while the size of the cylinder would indicate that the quantity contained was very much less. The acetylene being both absorbed by the acetone and entangled in the interstices of the asbestos makes the progress of the explosive wave in the cylinder impossible, and this accounts for the fact that with the extremely extended use of acetylene cylinders, accidents from any cause are few.

In speaking of acetylene cylinders and the absence of hazard, it must be understood that I am confining my remarks regarding their safety strictly to those cylinders which meet the laws of the United States as expressed through the Interstate Commerce Commission and which have had the approval of the underwriters. If the use of acetylene from cylinders is confined to those which have met these requirements the user is properly safeguarded.

The reason for the difference between the methods of compressing acetylene and other gases has not likely been given consideration by you as it depends upon the peculiarity of acetylene in which it differs from other hydro-carbon gases and is indeed unique.

The very high temperature of the oxy-acetylene flame is due not only to the combustion of the acetylene which means a chemical combination of the hydrogen and the carbon of acetylene with the oxygen, but to another quality which raises the temperature from the 4,000 degrees which marks the apex of temperature in any other combination to 6,500 degrees which is approximately the temperature of the electric arc. This peculiarity of acetylene and the extra vigor of the flame which makes it the only available flame by which general welding can be accomplished is due to the fact that when acetylene is formed, during reaction between the carbide and the water, the molecules take up heat instead of giving it off. The amount of latent heat locked into the molecules of acetylene approximates 300 British thermal units. This latent heat is called endothermic energy. When acetylene burns, the moment the molecule enters the flame it breaks, releasing its endothermic energy, and instantly the hydrogen and carbon combine with the oxygen adding to the combustion, and the temperature of the whole is thus concentrated in an instantaneous dissociation and recombination which acetylene its unparalleled temperature and its far-reaching usefulness.

The endothermic energy of the latent heat of the acetylene molecule must of course be given consideration when acetylene is compressed, for with each added atmosphere of pressure the distance between the molecules is reduced. It is a well established fact that when acetylene is under ordinary conditions one molecule may break and release its energy without having any effect upon those surrounding it, but when the distance is reduced by pressure the releasing of heat of one molecule will affect the whole mass and instantaneous dis-

sociation takes place. The possibilities of accidents from this source were early ascertained and the result has been that throughout the world laws have been passed which forbid the compression of acetylene above 15 pounds to the square inch unless the compression is done under well-known technical conditions and unless the compressed acetylene is immediately absorbed in cylinders containing asbestos, Kieselguhr or similar approved porous material, saturated with acetone or a similar approved solvent.

I have gone into the details of this subject so as to impress upon you as safety engineers the necessity of avoiding any attempt to compress acetylene into cylinders by any of the methods of compression used for other gases. I wish to warn you further against what appears to engineers to be a very simple method of securing acetylene under pressure by means of a generator so constructed that the carbide and water are brought together and the resulting gas accumulated until the desired pressure is attained. These generators are known as self-compression generators and at one time were constructed and held forth as safe by unscrupulous manufacturers with disastrous results. They are forbidden by the rules of the underwriters and by laws and ordinances in all countries, but occasionally even to-day I find foolhardy people who think they can disregard to world's experience. As this is a technical body I am sure that a moment's reflection will show that you should set your face against the use of unlawful generators. The approved generators limited to fifteen pounds pressure and the approved cylinders have been so well devised as to successfully safeguard the production and distribution of acetylene to the torch.

Oxygen

Oxygen is the only other element with which we are concerned at the moment. We are inclined to treat oxygen because it has been an article of commerce in notable quantities for but about ten years, as if it were something new or unusual, forgetting that one-fifth of the air we breathe is oxygen. Every fire that burns is an exquisite chemical experiment disclosing to us the combination of oxygen with some combustible substance. One-half of the earth's crust and one-fifth of the atmosphere, one molecule out of every three of the rolling ocean is oxygen. So far as man is concerned, oxygen is our most abundant and most active chemical element. One would suppose that it would have been separated from its combination and mixtures and utilized long before.

I never breathe a breath of fresh air feeling its vital necessity, or quench my thirst from the living spring, or see green nature changing carbon dioxide into trees, fruits and flowers, or warm my body before the hearth fire without an interior sub-conscious thankfulness to God for his greatest gift—oxygen.

Oxygen has for some years been produced for a medicinal purpose, giving a stimulating breath of life to tide over the most tragic and critical moments in

the sick room, but it remained for acetylene, one of the later children of man's ingenuity, to bring into commercial being the most abundant and necessary element.

When acetylene and oxygen combine, the warmth of their affection seems to indicate a true affinity which the excessive and accentuated temperature demonstrates.

Oxygen may be produced by breaking up certain chemical combinations or by sifting the mixed molecules of oxygen from the nitrogen of the air. Many elements will absorb or combine with oxygen at one temperature releasing the oxygen at a higher temperature. In some cases the range is too extreme to be useful, but in some cases oxygen is absorbed at atmospheric temperature and given off at temperatures easily attained. Certain processes for the production of oxygen known as the chemical method were based upon this fact. At the present time, however, these processes have been abandoned, and therefore need not be considered.

Chemical combinations may be broken up by electricity, and in water we have a chemical combination which contains but two elements—oxygen and hydrogen. If an electric current under suitable conditions is passed through the water the molecules of water are broken up into one part oxygen and two parts hydrogen, the oxygen will collect at one pole and the hydrogen at the other. If the elements are kept separated we have, by means of the electric current a method of producing oxygen and hydrogen from an unlimited source of raw material—water. The amount of energy required, the method of its application and the means by which the oxygen and hydrogen are kept separate involve high engineering talent and experience. The hazards of a mixture of oxygen and hydrogen in the same cylinder while sufficiently obvious still call for a note of warning to those who would undertake the manufacture of oxygen by this process, that all necessary precautions must be taken. The use of oxygen from this source should not be undertaken until the Safety Engineer assures himself that the plant is backed by well regulated and careful business organization in the hands of thoroughly experienced and conscientious people. If the production of oxygen by this process is to be undertaken by the user, experienced men should be in charge capable of making frequent accurate chemical analyses to check purity of both products in manufacture as well as in use.

The other source of supply of oxygen is the air itself. It has been discovered that if the air is cooled until it liquefies, by a delicate process of distillation nitrogen may be distilled off leaving the oxygen behind just as in the case of fermented mixtures the alcohol may be distilled leaving water behind. So successful has this process become that a very large percentage of oxygen now produced is made available by the liquid air process. The impurity in liquid air oxygen is the nitrogen of the air and the

resulting product is, therefore, without any hazard from the possibility of chemical recombination.

The production of oxygen is now a very large industry and plants and warehouses are widely distributed and adequate supplies are available everywhere. The question for the safety engineer is simply one of proper precaution as to the source of supply. If the oxygen is manufactured for use at the plant the serious considerations are the selection of high-class apparatus, its installation and securing the technical ability necessary to run, manage, and safeguard it.

Cylinders

On the question of cylinders, the Interstate Commerce Commission has spoken, and hazard from the cylinders as regards pressure explosions may be said to be eliminated. An oxygen cylinder contains oxygen compressed to 1,800 or 2,000 pounds to the square inch and has proved itself to have an adequate margin of safety to hold these pressures under all vicissitudes of transit and use. Literally millions of fillings and shipments have taken place each year, and accidents under ordinary conditions of use may be considered as negligible.

Apparatus

The apparatus used for combining oxygen and acetylene at the point of use which means the pressure gauges, regulating valves, hose and the blowpipe itself, are again under the jurisdiction of the underwriters' laboratories. Approved and permitted apparatus of high-class is built sturdily for use, is calculated to burn the gases with the greatest possible efficiency, both as to consumption and resultant available temperature. The user having selected his apparatus with these facts in mind attempting no short-cuts or false economies, will find himself protected at every turn by the co-operation of the best part of the industry with the underwriters, who happily, in anticipation of the development of the welding and cutting art in this country, laid down rules and regulations which have governed it ever since.

I have attempted to show that from the manufacture of the materials which you are called upon to use through the mechanisms of manufacture, transportation and use to the very tip of the torch in the hands of your workmen, the Government, the underwriters and the industry have co-operated with the idea of safety first being the basis of the widest possible use of an exceedingly valuable addition to the tools of industry.

As safety engineers you have but to adhere to the principles so carefully developed; buy good quality mechanisms and material, install your apparatus in accordance with the highest accepted practice, avoid experimental short-cuts, discourage false economies, and keep the welding and cutting torch in the hands of responsible people imbued with the spirit with which you are endeavoring to make a part of your employee's life, that is the spirit of safety first.

In expressing to you my appreciation

for your patient hearing I respectfully suggest that as the oxy-acetylene cutting and welding torch is placed in the hands of your workmen properly safeguarded, we may now well discuss the rules and regulations proposed by your secretary which will properly safeguard its use.

STANDARDIZATION AN AID TO WORLD PEACE

AT the dinner given in honor of Mr. Charles LeMaistre, Secretary of the British Engineering Standards Association, by the American Engineering Standards Committee, the guest of the evening, expressed the opinion that one of the strongest ties which can bind two or more nations together is engineering and industrial standardization.

This, the first function to be given by the American Engineering Standards Committee, took place at the Engineers' Club, New York city, Thursday evening, September 18th. It was attended by more than fifty engineers, representing practically every organization interested in the development of standards.

Responding to the invitation of Chairman Comfort A. Adams, who acted as toastmaster, Mr. LeMaistre said in part:

"Human language is but a very poor interpreter of the highest thoughts of the human mind, and I must plead with you and ask your indulgence as I can only be but a poor interpreter of the very high ideals which the British Engineering Standards Association has always set before it. The B. E. S. A. was formed in 1901 at the instance of Sir John Wolfe Barry, the doyen of our engineering profession, and it was through his able guidance during some sixteen years of the most important period of its existence that the association gradually gained the confidence of the people. We are now an organization of some three hundred committees and twelve hundred members who give their time fully to the work.

"Though much of the work of our committees is done in London, many of them meet in the centres where the particular standard under discussion is manufactured. This assures at the very outset that those people who are going to use the standards and who are in daily contact with the apparatus involved, and who have the closest knowledge of the details, shall put up the first proposals. This is not quite what we used to do, but we realize more and more that standardization is, shall I say, 15 per cent. technical and 85 per cent. human. Standardization is an industrial matter, and it is the industry that should put up the standards and get the help of the engineers and experts to support them.

"I hardly like to go into a discussion of the general principles of standardization, because I should feel that I was talking to my masters. However, we agree that standardization means efficient production. It can only be effective when overlapping is avoided. Overlapping can only be obviated by the op-

eration of some central organization, which we have provided in Great Britain with wonderful effect. We find now that overlapping of effort is becoming less and less each year, and the B. E. S. A. is becoming more and more recognized as the central authority for drawing up standards for the engineering and allied industries.

"During the last year or two I have received at my office numbers of letters from America inviting co-operation, and I have always been in some difficulty to know how to reply. Take for instance, the Electrical Industry, which has in this country at least a dozen organizations doing standardizing work. A request from one of these could not be accepted as from all. My association feels that, at the present important stage of the development of the work and of the closer relationship with the United States, if only we could get co-ordination of standardization on both sides of the water, one central authority on each side, it would not only help our industries enormously, but we could work hand in hand on these technical problems which involve this complicated human factor. And in doing this big work we would surely be no mean influence in promoting the peace of the world.

Following Mr. LeMaistre's address, Chairman Adams called for responses from the representatives present. Dr. C. O. Mailloux spoke as the chairman of the American Committee of the International Electro-Technical Commission, and as a close friend and admirer of Mr. LeMaistre. Mr. Nelson P. Lewis, past president and representative of the American Society of Civil Engineers, pledged the support of his society of the contemplated development of the American committee. Professor Charles F. Scott reviewed the beginnings of electrical standardization in America, which he regarded as the basis of international electrical standardization accomplished so far. Mr. Edwin M. Herr represented the American Society of Mechanical Engineers, and also spoke for this society. Mr. Guillaem Aertsen of the American Society for Testing Materials, introduced a pleasing analogy to emphasize the necessity for developing team work, which helps not only the team, but the individual as well.

Dr. S. W. Stratton, Director of the Bureau of Standardization, reiterated the readiness of the Government Departments to co-operate in the development of the committee's programme, and Mr. Charles M. Manly, President of the Society of Automotive Engineers, pledged his society. Mr. Ira H. Woolson represented the National Board of Fire Underwriters, Mr. A. Cressy Morrison spoke for the National Safety Council, Mr. G. H. Ramsdel told of the standardization work of the American Gas Association, Mr. B. F. Waterman represented the American Gear Manufacturers' Association, Mr. Charles W. Baker spoke for the Technical Press, and Mr. D. Knickerbocker Boyd told of the great need of standardization in building materials and design.



DEVELOPMENTS IN SHOP EQUIPMENT



HACK UNIVERSAL RELIEVING MACHINE

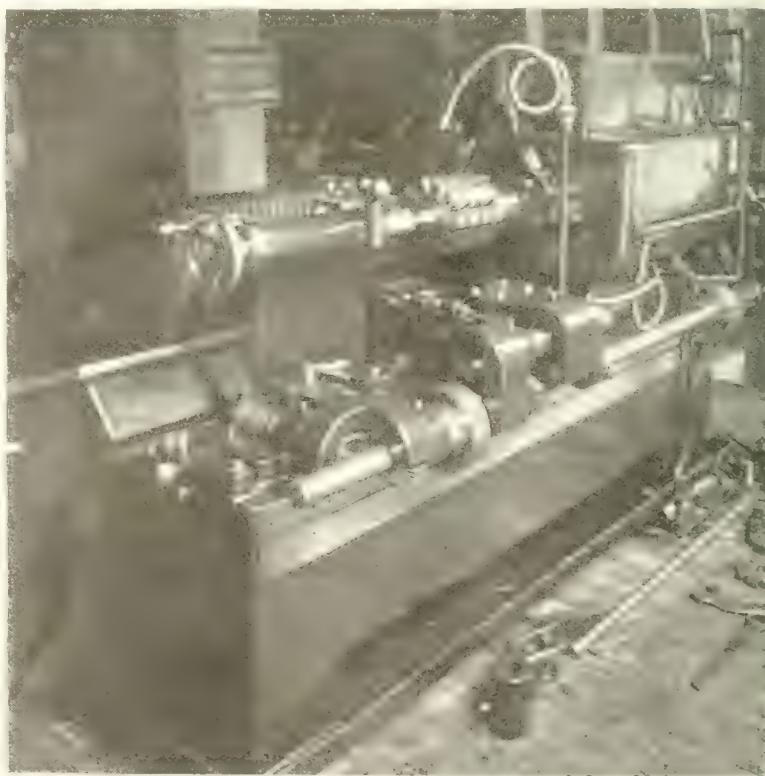
THE "Hack" high-power universal relieving machine is made in 6-, 10- and 16-inch sizes by the American Machine Tool Engineering Works, 4854-4858 W. Kinzie St., Chicago, Ill. This machine is constructed with the pan and legs cast integral, the pan being located close to the floor in order to afford space for a bed of ample width and depth. The bed is designed with two distinct sets of ways; the headstock and tailstock are carried on one set, and the carriage is supported by both sets. The second set of ways serves the additional purpose of supporting the side relieving attachment. The lead-screw is located between the rear set of ways on which the carriage travels, this location permitting of an exceptionally free movement for the carriage.

The headstock includes a number of new features of design, some of which are quite radical. Attention is called to the self-contained countershaft which forms a part of the head. Power is transmitted to this relieving machine directly from the lineshaft or jackshaft, through one forward and one reverse belt, without idlers or intermediates of any sort. The drive is carried from the pulleys to the head through a Carlisle-Johnson friction clutch, which is very sensitive and permits of instantaneous forward or reverse movement. Power is transmitted directly from the countershaft pulleys through spur gearing of various ratios to the spindle. Most of the gearing of the headstock is machined from 60-point carbon steel forgings, the bull gears having teeth of 4 diametral pitch in the 16-inch machine. Speed changes are obtained through sliding gears which are controlled by five levers, the gearing being as nearly fool-proof as possible and running in a bath of oil, which insures proper lubrication of all parts in the headstock. The spindle bearing and other bearings, regardless of how low the rate of rotation, are supplied by sight-feed oil-cups and tubes, making it readily apparent which bearings are obtaining the proper lubrication and which are not.

At the right end of the relieving machine there are two quadrants, one for change-gears for such leads as may be desired up to approximately 6 inches, and the other controlling the cam driving shaft which extends along the back of the machine. These change-gears correspond with the number of gashes or

with the spiral of the gashes as the case may be. The rear cam driving shaft is driven through change-gears from a stud in the rear end of the headstock, this stud obtaining its power directly from the large bull gear, although it rotates at six times the speed of the spindle at all times. By means of a ratchet dog on the camshaft the cam movement is suspended while reversing the spindle, and is ready to continue its rotation at the proper point when the spindle is again run forward. This cam driving shaft extends the entire length of the machine and is supported in bearings at

pound slide are liberally proportioned to take the tremendous force which can be transmitted through the spindle. The tool-block, which in itself is a horizontal slide, is made of carburized cast steel, hardened and ground on all working surfaces, thus insuring a rigid, accurate tool-block. The design permits of making micrometer adjustments when required or the tool-block may be securely locked. A safety device within the headstock prevents the carriage from being run against the headstock by accident. Likewise, a safety device on the tailstock prevents running the carriage into



HACK HIGH POWER UNIVERSAL RELIEVING MACHINE.

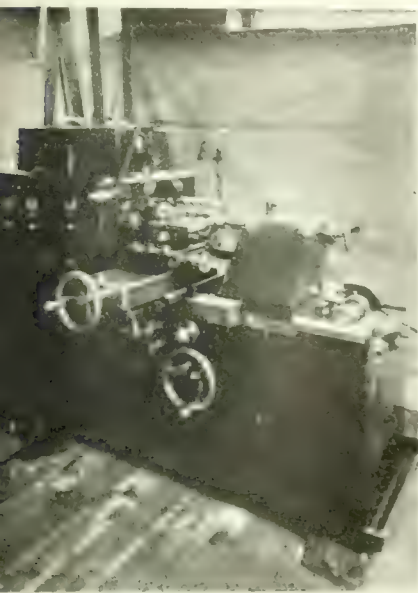
both ends. From it power is taken to rotate the cam arbor driving mechanism at the back of the carriage as well as the driving mechanism for the side relieving cam. Adjustments are provided to make it possible to time the two cams either in unison or independently, as may be desired. The side relieving attachment causes the entire carriage to move, while the regular relieving arrangement causes the cross-slide to move.

The carriage cross-slide and the com-

the tailstock. The tailstock is made in one piece, permitting of absolute alignment with the spindle at all times. No provision is made for handling tapered work. When taper relieving becomes necessary, a special spindle with an off-set centre may be furnished. The bolts and clamps for the tailstock are of such proportions as to make the tailstock as rigid as the headstock.

The carriage is actuated by means of a rack and pinion movement within the

iron. A special mechanism is incorporated within the apron to provide for concave relieving, the purpose of which is to relieve the bulge or barrel effect which occurs in all hobs and cutters several inches in width, as the result of hardening. The arrangement of this feature is such that where three hobs more of a kind are placed upon the



ANOTHER VIEW OF THE MACHINE

relieving arbor, each hob can be produced with a concave contour corresponding exactly in curvature and depth with that of the other hob in that set; where one large hob is being made, the curvature can be distributed in its proper form over the entire length of the hob. This curvature is controlled entirely from the mechanism within the iron and can be readily adjusted and set up for any desired length or depth of curvature. This relieving machine is completely universal, and is capable of relieving spiral or straight-gashed hobs, plain formed cutters and right or left-hand counterbores, as well as performing internal relieving operations on special tools when such may be required. The weight of the 16-inch machine is approximately 8,000 pounds. Its capacity is such that it will take a cutter 14 inches in diameter or one 16 inches long. However, cutters of 6 inches in diameter or smaller can be successfully relieved on this machine. For work varying in diameter from 6 to 10 inches, the 10-inch machine is recommended, and for work smaller than 6 inches in diameter the 6-inch machine is capable of answering all requirements.

FEDERAL SELF-OPENING DIE HEAD

The self-opening die head which is made by the Federal Products Corporation, 393 Morris Ave., Providence, R.I., is so arranged that ordinary button dies, procurable at almost any tool supply house, may be used instead of specially made tappers. These button dies are split

and the rough edges ground off at a slight angle, after which they are ready to insert in the die head shown in Fig. 1. Fig. 2 shows another view of the die head, the parts in this view being disassembled.

The die head, as can be seen, is very simple in construction and can be cleaned in a minute or two without changing

THE HANDLING OF CRUDE RUBBER

A rather important change in the manner of handling crude rubber in the Far East has been made in the new general custom in the trade to pack the product in bales for ocean shipment instead of in the comparatively loose packages in which it has been shipped heretofore.



FIG. 2—THE DIE HEAD DISASSEMBLED.

the adjustment. The die sectors are firmly held in the jaws and positively supported around their entire circumference so that they will cut a straight, full and accurate thread. Any thread within the range of button dies may be cut with this die head. The die may be closed by hand or by an automatic lever device when used in a turret lathe. The die holder may be used in the turrets of hand or automatic screw machines or in a lathe. All parts are made of alloy steel, carefully heat-treated and hardened.

The practical effect of the new method is to reduce the bulk of the product packed for shipment by about half and on the average to cause its weight to approximate its bulk in ship's ton measurement, i.e., 2,000 pounds of rubber baled occupies substantially 40 cubic feet. In shipping this has the effect of classifying rubber as heavy cargo instead of light cargo and materially affects the nature of shiploads leaving the various Far East rubber exporting ports

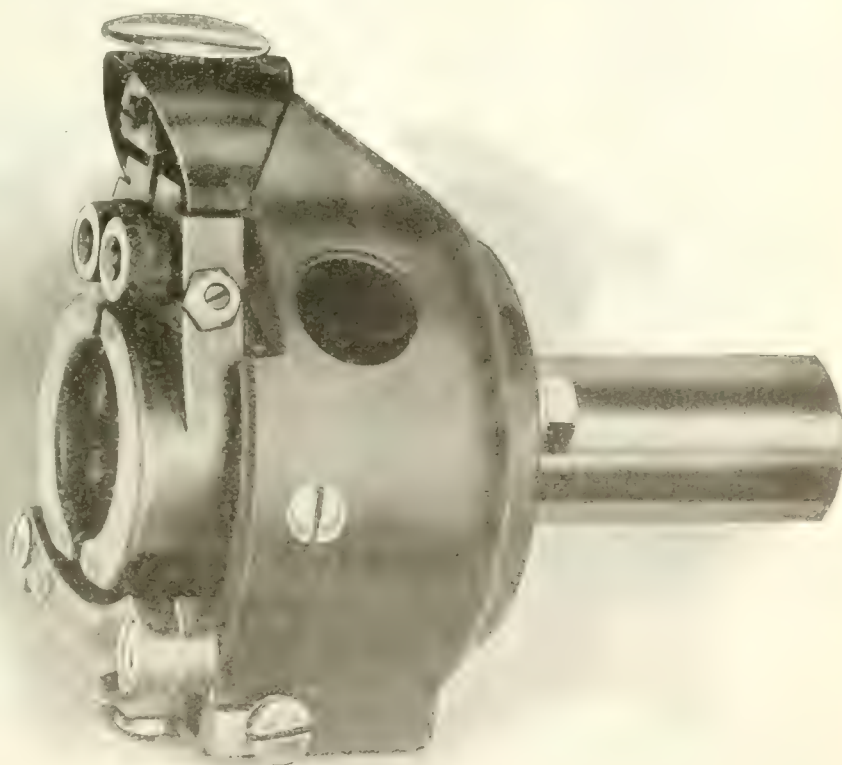


FIG. 1—FEDERAL SELF-OPENING DIE HEAD COMPLETE.

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Wasting Too Many Hours

CANADA has been facing a great chance ever since the close of the war. The world wanted everything that this country was in a position to make. Countries that had been at war for four years were at once customers, and big ones too, as soon as credit and terms were arranged.

Canada has, in a great big sense, been kicking this opportunity around ever since the war stopped.

The only thing most necessary has been production, and still more production.

The one thing that has been most outstanding in all our commercial blunders has been the manner in which production has been curtailed.

The mechanical world failed to grasp the big reason for high wages during the making of munitions. That big reason was PRODUCTION. Had production been stifled or output regulated according to "this much per day and no more," wages would not have been anything to compare with the pay envelopes that munition workers carried home during the war years.

During the month of July, Canadians, in strikes and lockouts, blazed away 561,010 working days. In August, they idled 316,187 working days. In two months 877,197 days. In another way, one man, could he live that long, wasted 2,923 years, counting 300 working days to the year.

Now, it is as plain as the nose on your face that this country cannot stand that.

Strikers can argue until they are black in the face that speedy production will soon fill the world's markets and in that way make more workers than jobs, but they cannot get one inch away from the economic fact—not

theory—that lack of production and a great buying wave is keeping prices up on everything they have to purchase.

Canada should get to work. Britain is not in a position to export. United States has troubles that keep her factories strained in many lines to attend to domestic needs. Canada, rich in minerals, rich in forests, rich in water powers, rich in broad acres of good farming lands, can go in and produce and grow without any fear of forcing any man out of work.

Remember, by this we mean that a man going to work must become a worthy producer. We have now an excess of people who persist in camping on the necks of those whose business and work justifies their commercial existence.

We do not mean that we call upon men to go to work if their going is simply the means of jamming another raker in the line of those who have wedged in between producer and consumer.

But it's time serious-minded Canadian citizens, we care not whether members of unions or employers of labor, make this a chief matter of concern.

The only danger lies in the fact that industrial life has had such a gruelling in the matter of strikes and unrest, that it may not rally as quickly as the needs of the case call for.

It is not possible to let a certain line of goods go to the dogs for six months, and then expect, on resuming manufacture, to find marketing and production on a par with the day of cessation.

THE latest thing is shipping whiskey and marking it as castor oil. If Old John Barleycorn has to make a face like a mouthful of castor oil in order to get past, we feel sorry for him.

* * *

THERE are many striking things—and people—in this old world.

* * *

DURING the war one big British concern, the Manganese Bronze & Brass Co., turned out propellers for the largest British war vessels. The castings weighed 30 tons each, and were too large for rail transit, and, as it was considered too dangerous to risk despatch by sea, they were forwarded by road 450 miles from Glasgow. The propellers cost \$25,000, and the haulage charges were \$17,000.



Shafer in Cincinnati "Post."

Signs of the times.

Did You Ever Do This?

I MET my friend upon the street, his face was out of plumb; his countenance was far from bright, in fact 'twas sour and glum—he looked as though his wife had just begun to try on him, some sixteen kinds of fancy eats to stow beneath his skin.

He waddled 'cross the street, he did, with stride both poor and lame; you couldn't call it rheumatiz, nor was this fellow lame.

But I had known this chap for years, in seasons good and bad, nor had I seen his map before so wrinkled nor so sad. I thought some grief had come to him and smote him on the jaw, or else he'd been pulled into court for bustin' up the law.

So I drew nigh unto this prune, and sought to cheer this boy. I cracked ten jokes and cackled, too, to spray his soul with joy.

He never budged an inch, by heck, his sufferin' was intense; there camped upon his carcass now a spasm most immense.

"Come tell me now what's all about, this grief what's smote your life—be it an illness in the house, or have you canned your wife?"

He drew my head toward his chest, and bade me flop an ear, and meantime tried to choke a sob and boot away a tear—and then he lifted up his voice and told me of his woes—he had that day put on his hide his woollen underclothes!—ARK.

Germany's Copper Shortage

ONE result of the Allied blockade of Germany was seen in the many expedients to which the Hun was forced in the obtaining of the 120,000 tons of copper necessary annually for military requirements. Home production was only about 23,000 tons per annum in pre-war days and this was reduced to about half owing to the mobilization of the miners.

The *Technical Review* in a translation of an article from *Technick und Wirtschaft* gives some further interesting data relative to the economies practised. During the first two years of the war the deficit was partially covered by booty from Belgium, France and Russia. Large quantities of scrap copper and brass were collected from munitions works and from fittings on naval and mercantile vessels, the scrap being smelted and refined.

Copper and iron-bearing slags were treated by the Dwight-Lloyd process, the roasted product with 30-80 per cent. Copper being refined to 89-90 per cent. and cast into cathodes. Brass scrap was smelted in basic Bessemer converters, in which by using a compressed air blast the refining process was shortened from several days to a few hours. The zinc fumes were cooled in a system of tubes to 50° C., and collected in bag filters, the contents of which were compressed into blocks and converted into metallic zinc by the electro-thermic process.

Bronze scrap with about 90 per cent. copper and 10 per cent. zinc was successfully treated by electrolysis, the metal being formed into cathodes which were electrolyzed in copper sulphate, several weeks being required for the deposition of the copper. The dried sludge from the process contained up to about 60 per cent. of tin which was recovered as pure metal.

To minimize the consumption for army purposes all brass and copper uniform badges were abolished and zinc replaced brass in munitions. In spite of rigid economy the consumption remained enormous, and by the end of 1916 stocks had become exhausted. This necessitated the substitution of iron in cartridge cases, caps and driving bands, all tubes and wires in electrical plant, torpedo tubes and propellers on small war vessels. For medium shells, zinc driving bands were used, and electrolytic iron for those of large calibre.

In the navy, cast brass (55-60 per cent.) replaced Admiralty bronze, the tendency of the former alloy to pipe and froth in casting hollow articles being counteracted by making the gate of equal capacity with the

mould, and allowing time for the included oxides to rise to the surface before actually running the metal into the mould. The risers were also plugged and the imprisoned air only released when the mould was nearly full. These alloys failed to withstand friction and, therefore, parts exposed to heavy wear had still to be made of Admiralty bronze.

The Steel Strike

THE steel strike in United States gets short shrift from Rev. P. Molyneux, pastor of St. Brendan's Roman Catholic Church at Braddock, Pa.

His parish is right in the steel mill district. He said on a recent Sunday in his church: "This strike is not being brought about by intelligent or English-speaking workmen, but by men who have no interest in the community, and who do not have the welfare of the men at heart."

Father Molyneux said to his congregation that he held no brief for any mill or any company or any trust. Within the last two weeks, he said, he has talked with at least 200 mill workers with regard to the strike, all intelligent, English-speaking workmen, some from his own parish and some from outside. "I could not find one instance," he said, "among these 200 men where the man wanted to go on strike. They all stated positively and clearly, on the other hand, that they were well treated and satisfied with conditions."

"There is one thing I have noticed about these strike leaders," continued Father Molyneux, "and that is, with very few exceptions, if any at all, they never had on a workman's blouse in their lives, never went into a mill in a pair of overalls—these men were never seen with the honest sweat of toil on their brows. The tan of brawn is not on their hands. They are a lot of smooth, oily tongued talkers, with a kind of sympathetic whine appealing to you. They are royal gentlemen of leisure; they always wear fine clothes."

It has not been explained why Samuel Gompers tolerates the leadership of William Z. Foster in this strike, unless it is that Mr. Gompers has some special and unpublished reason for fighting the head of the U.S. Steel Corporation.

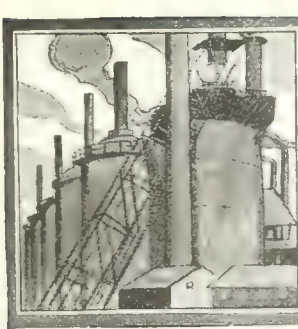
The strike bears the earmarks of agitation rather than of an abused people battling for better conditions.

On the other hand, it has been shown beyond successful contradiction that employees of the Steel Corporation are well paid, work reasonable hours and in the main are well satisfied with their work.



Thomas in Detroit "News."

Why did they civilize us when we were happy?



MARKET DEVELOPMENTS



Shipments from Strike Zone Are Slower Now

Warehouses Are Better Off Than Firms That Have to Go to the Rollers for Each Separate Order—Quite a Demand for Used Machine Tools on Account of Inability to Secure New Quickly

SHIPMENTS are coming through to Canada from mills in the steel strike zone, but it must be admitted that these shipments are not as large or as frequent as the demands of the trade. It is a peculiar situation, but a true one, that the warehouses are better off than their customers in many cases. Warehouses deal almost entirely in standards, while their customers want as well orders rolled to specification. The warehouses can draw for some time on the accumulated stocks at the U.S. mills, but orders that must be rolled now are going to be slow in delivery.

A conservative estimate seems to place the men out on strike at forty per cent. It does not follow that production has only decreased forty per cent. It has decreased more than that, because there is no doubt that in some cases men are kept on for the moral effect rather than for their ability to turn out iron or steel. It cannot be said that Canadian trade is suffering yet. The Canadian mills are handling an increased tonnage in several lines. If the strike continues for several weeks yet there will be concerns on this side of the line hard pressed for their raw materials in manufacturing processes.

There has been very little tendency to jump prices on account of the shortage of material. The Steel Corporation policy is strongly against such a move, and this no doubt has a steadying effect on the whole situation. In only one case has a report been received of a mill—one of the independents—asking for a 20-cent per hundred premium on plate.

Machines tools houses are handling a nice volume of business. Deliveries are not improving, and business in some cases is booked now for February shipment. Prices are high, and they are going to stay high. War levels are quite common. This is creating quite a demand in some quarters for used machinery. Very often a customer wants a machine at once, and a used tool is all he can get. Then, again, there is a big spread in the price between the used and the new, although the price is not a determining factor in many sales.

The scrap yards are shipping little material now to United States points. The strike has tied up the yards there, and they are not taking shipments. Trade on that account is inclined to be a little dull, with coppers showing some weakness.

MONTREAL RELIEVED TO HEAR OF BRITISH STRIKE BEING SETTLED

Special to CANADIAN MACHINERY.

MONTREAL, Que., October 8.—The tension that was becoming more pronounced during the week, as a direct result of the industrial conditions in England, received a favorable reaction to-day, when it was learned that arrangements had been made whereby the men would return to work pending further adjustment of the differences between the men and the administration. The British situation was reflected here in the irregular activities in the harbor, and to some extent the export of produce and materials had been interfered with owing to the inability of shipping companies to guarantee unloading at the English destination, due to the congested state of the terminal docks. With this situation clearing attention is centered in the labor troubles in the States, but the serious nature of the American troubles is gradually fading, as the strike, so far, has had little direct effect in this district, although the influence is not conducive to expansion of activity.

While the general tendency is one of conservative trading, the business of the week has been quite normal. Some dealers have experienced a little difficulty in getting goods in from the States, but the reports for the past few days have been more encouraging. Steel business is not heavy, but a slight inconvenience is beginning to show itself in plates and tubes, the warehouse supplies in these lines having fallen off slightly during the past two weeks. One factor that prevents the situation becoming more serious is that the existing demand is below normal, and, so far, dealers have been in a position to fill all the requirements of the trade.

Lighter Tool Movement

Summing up the reports that are gathered from dealers it would seem that the movement in machine tools is not very brisk, and the demand is considerably less than for several weeks past. What little business is reported

is going to a variety of industries and no special development appears in any direction. Circumstances combine to influence the buyer along conservative lines as existing conditions of labor and material costs are not those to induce cautious manufacturers to branch out into new or renewed activities. There are cases, however, that lead one to believe that many new enterprises would take on a larger sphere if industrial stability were more definitely assured. Inquiries seem to impress the trade in this connection. The supply market is one of nominal demand with little change in prices generally.

Listless Scrap Market

The movement of scrap is virtually at a standstill and the bulk of the trading is of a local character, foundries calling for regular supplies but in small quantities, the conservative nature of the buying indicating that little consideration is yet being given to other than immediate requirements. Old metals have developed a weakness but local quotations are maintained. Scrap iron and steels are quite firm but quiet. Cast iron is stronger, the quotation of \$21 representing an advance of \$1 per ton.

STRIKE EFFECT TO BE FELT HERE YET

Although, So Far Local Trade Has Been
Able To Get Along With No
Trouble

TORONTO - Trade generally does not like the continuation of the steel strike in United States. So far, nothing is suffering in this country, but it is only a matter of time until something will have to give. While it is true that probably sixty per cent. of the men employed at the steel mills are working—and that figure seems about right—it does not follow that production is sixty per cent. of what it was when the strike was called. There must be mills where men are kept on for the moral effect of keeping them on and there must be cases where production is away below the amount that might reasonably be expected from the number of hands on the premises.

In the Steel Trade

In a general way, it can be said that the steel trade is not suffering yet. It is a strange situation, but none the less a fact that the warehouses are better off than their customers. Warehouses take on standard sizes in everything, and in this way they can get more from the yards of the mills now than many of their customers who buy direct from the mills because their orders are all special and odd sizes. The factories, especially where much boiler and tank work is done, are in the same position as the man who gets his clothes made to order. Nearly every order they send out has to be made up for them, and now that capacity is away down it is only to be expected that there will be congestion and delay. As far as the warehouses are concerned it must be said that the American mills are making a brave attempt to give them service, as shipments of fair-sized tonnages are still coming over the line.

In a general way, sheet and plate are hard hit. This is especially in regard to sheets. There has been a big demand for sheets for some time back, and warehouses are not well supplied.

The tube mills in some cases are still shipping against recent orders and material is arriving this week. This is true of the lap weld, but the cold drawn are down for the most part. There is very seldom any stock at the mills. Tubes are sold nearly altogether through the jobbers, and the former protect the latter in nearly every case. Men generally buy tubes in small lots for repair jobs, etc. This country depends on United States for its supply, and that supply is in danger. Neither is there a good stock in the warehouses at present, while the demand is strong.

The Matter of Prices

As far as CANADIAN MACHINERY has heard, only one of the independent mills has intimated that it wanted an increase for delivery, and that was 20 cents per hundred premium on plates. None of the Steel Corporation mills want

POINTS IN WEEK'S MARKETING NOTES

The steel strike does not progress, neither is it broken. Production is not as large as might be expected from the number of men working.

In a general way the sheet situation threatens to become the worst by reason of the strike.

Warehouses are getting shipments of standard sizes from the mills, but firms wanting sizes rolled to order are not being served.

The demand for used machinery increases in some quarters. Reasons for this are deliveries on new tools too far distant for a man who wants a machine at once, and prices are at war levels, or even better.

Dealers in cutters claim they have "hard-going" under present conditions and terms of sale. U. S. buyers are paying more for cutters than Canadian purchasers.

Scrap sales are uncertain on account of the steel strike. No shipments are going across the border from Canadian yards.

Offices selling steel are certain there will be a great congestion of orders on the books, to be looked after when operations become normal.

any higher prices than have been prevailing all along.

"Prices were due to stiffen in Canada, strike or not," stated one of the warehouse men to CANADIAN MACHINERY this morning. "For some time past there has been something close on to a stampede in certain places to get stock cleared out and turned into money. The end of the war left some firms with too big a stock and they were anxious to get out and turn it into ready cash. The way to do this was at a price. This at times took in sheets, and another time bars. These stocks have been reduced to the point where those warehouses must now follow the market. When they go in for more business they will first of all have to go into the market and they will then know exactly what they have to pay. This stampeded business has been pretty well cleared out, and stocks to draw from are low and may go lower if the strike lasts."

There were a good many rumors around for a while that plate could be secured, if one were to buy "hard" enough, for 2.50, rather than at the supposed price of 2.65. It may be that some plate did come to Canada at 2.50, but if so it was very small in tonnage, as dealers seem to have adhered all the

way through to the 2.65 basis for quoting. Certain it is, that there is no chance for anything going across at 2.50 with the strike on.

September was a great month for some of the warehouses handling steel products, such as plate, sheets, tubes, shapes, etc. One of them told CANADIAN MACHINERY this morning that the month just closed was twice as large as anything that had been done this year, and from the looks of things the same firm expects that October will be quite as good, unless trouble at the mills gets at the point where no material can come through. Selling is not such a task as it was three months ago. In some respects it reminds one of the war days when all a salesman had to do was to intimate that he had certain lines of steel or machinery and he might be induced to dispose of them at a price.

The Machinery Market

There is a peculiar tendency in the machine tool market just now, and one that looks like more palmy days for the used machine. Deliveries on new tools are rather uncertain. Some that are booked no ware for February shipment, and very often a customer wants a machine right away. Well, when the price is considered and the chances of shipment, he naturally turns to the used machine market. There is business to be done here now, and it would be a good idea for those that have used machinery to advertise the fact, telling what they have.

The prevailing prices are high for new machinery, but salesmen say this does not interfere with sales at all. The big idea now in nearly every case is to get the machine suitable for the job that will turn out a lot of work and the price paid is not a great matter, because the buyer reckons he can get it out of the machine in production.

Supplies Are Brisk

Travelers for machine tools—small—are gathering in a lot of business just now from shops that are getting under way with production. The automobile business is responsible for a good bulk of the sales.

Many of the firms selling certain lines, such as cutters, claim that they are not getting the protection they should from the makers. In United States, they claim, customers can buy cutters at net, while the jobbers get ten per cent. off. Of course it is hard for the Canadian dealer to sell U.S. cutters, on account of the duty and other charges. But in Canada, cutters are now selling at ten off to consumers direct, and the jobber is practically wiped out, because it does not take long for purchasing agents to learn that a certain price is being quoted. It is all the more extraordinary that the Canadian consumer should buy at such a low figure when one considers that the market here is smaller than in the States, and duty must be paid on much of the material that is brought in to manufacture the articles in the first place.

Some of the representatives of Canadian plants were in session in Toronto a few days ago, concerning the matter of discounts, etc., but it is not known if anything definite was accomplished.

The Scrap Metal Market

Shipments from this side of the line are held up, as far as United States centres are concerned. Requests have been received not to send material on against contracts in some cases. This

all tends to bring about a period of quietness in some sections of the scrap market, although there are some domestic sales being put through.

Coppers are not strong, although they have not been marked down. Still there is no marked desire on the part of buyers to take them on at present prices.

The item "shell turnings" has been dropped from the list of material quoted in this paper, as there is very little of this left in the country.

CANADIAN PLANTS NOT HURT YET BY THE UNITED STATES STEEL STRIKE

According to reports that have been received Canadian firms are getting along with no great inconvenience from the steel strike.

Fort William.—Locally, the United States steel strike is not making itself felt. At the Canadian Car and Foundry plant all the steel needed to keep things going is on hand, with the exception of one shipment, which is coming from Duluth and is now on its way here by boat. J. F. Paige, general manager of the Port Arthur Shipbuilding Company, says that they are feeling no effects from the strike as far as shipments of material are concerned. All the steel needed is now on hand and what is on order and is not yet received is from warehouse stock and will come forward, it is expected, in the regular way.

All Right in Sarnia

Sarnia.—The management of the Sarnia Bridge Company, probably the largest users of steel in the city, stated that they had a stock of steel on hand which would keep them going for at least six months. About ninety employees are at present engaged in bridge building, and from 500 to 600 tons of steel were used monthly. The company did not anticipate a shut-down and had no cause for alarm, and would continue to employ a full force.

C. H. Helby, of the Mueller Company, stated that he did not believe it would have any effect on their plant unless the strike continued a long time. The Mueller Company also had sufficient on hand to keep their plant in operation for some time. Mr. Helby said that the strike might cause a fluctuation in the price of material, but as far as the operation of their plant was concerned there was no cause for worry.

The Imperial Oil Limited purchase large quantities of steel, which is used in the construction of tanks and in various ways about the plant. With a large stock on hand, W. J. Gilchrist, the manager, stated that they could operate for a long time regardless of the steel strike. "It depends on the duration of the strike," said F. W. Gigax, of the Goodison Thresher Company. "We are well fortified and have enough steel in stock to last us until the first of February. Our company buys in large quantities and at present I see no cause for alarm."

That the strike would not last very long was the opinion of Mr. Gigax.

The Doherty Stove Company, employing a staff of about sixty men, are fairly well fortified, and have sufficient steel to keep them going until about the middle of December, was the information given out by W. L. Doherty, of the Doherty Stove Company. "Fortunately we had some ordered and we received a shipment yesterday," said Doherty. "I do not anticipate any trouble as I am under the impression that the strike will be settled before our supply runs out," concluded Mr. Doherty.

ROLLS-ROYCE GOING TO BUILD THEIR CARS IN UNITED STATES

Special to CANADIAN MACHINERY.

NEW YORK, October 9—While the steel strike is holding up buying of machine tools in some lines of industrial activity, plans for industrial expansion, particularly in the automotive industries, go on without interruption. An interesting development is the prospective increase in automobile and tractor manufacturing in the East. The Willys Corporation, which recently purchased the plant of the Duesenberg Motors Corporation at Elizabeth, N. J., will more than triple the size of this plant, and within a few weeks will be in the market for considerable new equipment.

The Willys Corporation will manufacture at Elizabeth a new six-cylinder car, which, it is reported, will be sold at a price somewhere near \$1,000. Production at the rate of 550 automobiles a day is being planned for.

Rolls-Royce in America

Another important automobile development is the plan of the Rolls-Royce Co. of England to build an American plant, which will in all probability be located in the East. Several plants used for war purposes are now under consideration and a selection will be made soon. The Rolls-Royce Co. has opened an office at 23 William Street, New York, and has bought used machine tools with which to begin initial manufacturing operations. Eventually its purchases of machine tools will run into large proportions.

Sherbrooke Conditions

Mr. A. G. Campbell, of the Sherbrooke Iron Works, took an optimistic view of the situation when questioned on the matter.

"At present," he said, "there will be no effect upon local industries, not at any rate on our plant. We have a sufficient supply of raw material to last us through a considerable period. If the strike should keep up for any great length of time I suppose it will have its effect, but I do not think the steel companies would have let the men go out unless they had on hand a large supply ready for shipment."

The McKinnon Steel Company said that they did not anticipate any trouble, at least for some time to come, and hardly thought that the strike would last for a sufficiently long period to have any great effect on conditions here.

"We have a large stock on hand which should last us through. If, however, the strike lasts for a long period, and our supply gives out, it will then result in the delaying of contracts, which will have a decided effect on industries here."

Mr. Newton, of the Canadian Ingersoll-Rand Company, said that no difficulty was to be expected, but that a continuation of the strike would have its effect in cutting down the supply of raw material.

Henry Ford & Son, of Detroit, manufacturers of tractors, have started work on a new plant on Green Island, in the Hudson River, near Albany, New York. This plant, when completed, will employ about 30,000 men and will turn out Fordson tractors for the export trade. Equipment probably will be bought at Detroit, although this has not definitely been made known yet. The expansion of the units of the General Motors Corporation will extend to the plant of the New Departure Mfg. Co., Bristol, Conn., which will be greatly enlarged. Quotations on several hundred machine tools are now being asked for. Total purchases for the New Departure plant will probably reach \$1,000,000.

The Columbia Gramophone Co., Bridgeport, Conn., has plans for the construction of an additional manufacturing plant in the East, and will likely make an announcement soon.

The Export Business

In export trade there is a very fair amount of inquiry. It has been somewhat surprising that several large machine tools have been purchased for shipment to France, despite the disadvantage of about 60 per cent. in the exchange rate. The Cerro de Pasco Mining Co., New York, has purchased four cranes and is in the market for about 50 machine tools for shipment to its mines in South America. Another foreign inquiry is for an automobile

manufacturing plant in Japan, a list of about 100 tools having been put out by Shibakawa & Co., 120 Broadway, New York.

The National Machine Tool Builders Association will hold its annual fall convention at the Hotel Astor, New York, on October 15 and 16, and American machine tool export trade will probably come in for considerable discussion. One question agitating the trade is the extent

to which foreign purchases should be financed here, and the methods of granting credits that should be adopted. It is stated that to secure much business in some of the European countries it will be necessary to grant one and two-year credits, and a plan may be discussed by which this can be done without overtaxing the financial resources of the machine tool companies.

SHEETS AND TUBES ARE THE MOST AFFECTED ITEMS BY STEEL STRIKE

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., October 9.—The iron and steel strike, now just in its third week, is running true to the form shown in the first four days, when, after increasing for a couple days, the strike began to lose ground slowly in the districts where idleness was in the minority and employment in the ascendancy, while districts closed tight showed no disposition toward resumption.

It is a matter of intimidation, which means minority rule if the minority is of any size. Thus in Western Pennsylvania, where the strike did not get a good start, employment has been increasing so that the works that remained in some sort of operation are now running practically full, while of the few plants that closed entirely some have been resuming in the past few days. The Mahoning Valley, including Youngstown, also Cleveland, but not the nearby town, Lorain, remained closed tight during the first two weeks, as well as the Wheeling district, with the exception of a very few plants in that district.

There were predictions that this week some important resumptions would be begun in the Mahoning Valley, but full and authentic information is requisite before it can be accepted as positive that the district really is resuming. Men have been at work in some of the plants, doing odd jobs and being held as nuclei for such a general return of men as would permit of regular manufacturing operations being undertaken.

There is no question that the men have lost the strike, and in fact there was no question after the first three or four days of the strike. Too much capacity was left in operation for the idle districts to swing the active districts. It is a strike of common labor, chiefly ignorant foreign labor, ready for violence whenever and wherever there is an opportunity, and while no doubt the civil authorities are anxious to prevent disorder it is a difficult matter when mobs of hundreds or thousands may form. The common prediction is that general resumption can hardly occur in Ohio without the state militia having previously been called to the scene, but under the law the invoking of state aid cannot occur until there is an actual situation that the local authorities can-

not handle, and the local authorities must admit the fact.

Production and Employment

The best estimate that can be made is that fully 40 per cent. of the workers in the iron and steel industry are idle. This is of the manufacturing industry proper, not including the Connellsville coke region, the lake or boats or the ore mines. The strike did not touch these activities at all and if they were included in the total the percentage of men idle would be a trifle lower.

Of the men idle it may be estimated that one-fourth desired beforehand to strike, that one-half, or double that number, really did go out as strikers when the time came, and that the other half comprise men who are idle because intimidated or because the strike was prevalent enough in the plants that employ them to make operation impossible. While the strike is distinctly a common labor or "hunky" strike it is not universally so. It is a fact that a few skilled and semi-skilled men did strike, and this was notably so in the case of one craft, the cranimen and electricians, who struck in considerable numbers.

Running or Closed

Geographically, as the strike was largely geographical and became wholly so during the first fortnight, the situation is as follows:

Eastern Pennsylvania is operating with scarcely an exception.

The large Cambria plant at Johnstown, at the western foot of the mountains, is closed entirely, as is the entire Lackawanna Steel Company property at Buffalo, together with part of the other operations there.

Western Pennsylvania is running nearly full, the chief exceptions being the Page and Pittsburgh steel and wire plants in Monessen, at the head of the Monongahela Valley manufacturing districts, a part of the city works of Jones & Laughlin and a few small plants here and there.

All plants in Cleveland, O., are down, but the Lorain pipe mill of National Tube Company is running very well.

The entire Mahoning Valley, in Ohio, is down, thus contrasting sharply with the other valley, the Shenango, just

across the state line in Pennsylvania, which is running nearly full.

The Wheeling district, which has long been strong for strikes, is closed tight, except for two or three relatively minor plants.

In the Calumet district, Chicago and Gary, about one-third or thereabouts of the men are working, results being rather unsatisfactory.

Duluth, Minn., is reported working while the works of the Colorado Fuel & Iron Company at Pueblo are closed. Practically the whole south is working.

Production Suffers

While nearly, if not quite 60 per cent. of the men in the iron and steel industry are working, production, in point of tonnage, is not in altogether as high proportion, as there are works with light employment and still lighter production, operation being partly for moral effect. It being an issue upon which the manufacturers cannot possibly yield, the open shop versus domination by radical labor agitators and revolutionists, tonnage is not an item showing how the strike is going, employment being the item that furnishes the information.

The curtailment in output is more or less uniform in the different products, but there are variations. Plate capacity was so in excess of requirements that there is still an adequate or nearly adequate supply. There is nearly an adequate output of structural shapes. Tin plate production is less than half what it was averaging just before the strike, but as the canning season is over the restriction does not count for much. In wire products there is great restriction, but wire products are now largely out of season. In sheets the situation is very serious as sheets were scarce before the strike. The American Sheet and Tin Plate Company has been operating at least 72 per cent. of its sheet mills, seven of its plants being in full operation, but independents are averaging less than 50 per cent., so that sheet production as a whole is not over 60 per cent. of normal. On the whole, sheet plants making specialties, as for metal furniture and automobiles, are affected slightly less than mills making common sheets.

The Worst Item

By far the most unfortunate situation, from the standpoint of production and requirements, is that in pipe. While there was no abnormal demand, before the strike, for butt weld merchant pipe, there was a demand far beyond the supply for oil country goods, involving lap weld material, there being in fact an acute scarcity, so much so that many lessees, particularly in the Texas field, were likely to lose their leases through being unable to complete wells within the time limits they had injudiciously agreed to. The situation is, of course, greatly accentuated, for while the Steel Corporation is doing well in pipe, much more than half the independent capacity is down, including Youngstown Sheet

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	\$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
	\$38 00-40 00
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon .25% to 2.75% \$32.75 to \$35.75	

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	\$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base....	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in....	6 50
Chequered floor plate, 1/4 in....	5 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill....	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh....	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small sapes	4 25
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 Pounds.	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal	33	45	
St. John, N.B.	41½	55	
Halifax	49	64½	
Toronto	27	39	
Guelph	27	39	
London	27	39	
Windsor	27	39	
Winnipeg	89½	135	

METALS

	Gross.	Net
Lake copper	\$25 50	\$26 25
Electro copper	25 00	26 00
Castings, copper	25 00	25 00
Tin	39 00	58 00
Spelter	9 50	10 00
Lead	7 25	7 00
Antimony	9 75	10 50
Aluminum	33 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, 1½ up	\$ 4 50	\$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

	Standard	Buttweld
1 in.	\$ 6 00	\$ 8 00
1½ in.	4 68	6 81
2 in.	4 68	6 81
2½ in.	6 21	7 78
3 in.	7 82	9 95
3½ in.	11 56	14 71
4 in.	15 64	19 90
4½ in.	18 70	23 76
5 in.	25 16	32 01
5½ in.	40 37	51 19
6 in.	52 79	66 94
6½ in.	67 16	84 18

	4 in.	79 57	99 74
Standard Lapweld			
2 in.	38 81	35 34	
2½ in.	42 12	52 36	
3 in.	55 08	68 47	
3½ in.	69 00	86 94	
4 in.	81 75	103 00	
4½ in.	93	1 18	
5 in.	1 08	1 37	
6 in.	1 40	1 78	
7 in.	1 83	2 32	
8 in.	1 93	2 44	
9 in.	2 22	2 81	
10 in.	2 66	3 36	
10½ in.	2 46	3 12	
11 in.	3 17	4 02	

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.	
4½" and larger 50%.	
4" and under, running thread, 30%.	
Standard couplings, 4" and under, 40%.	
4½" and larger, 20%.	

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds.	Montreal	Toronto
Copper, light	\$15 00	\$13 75	
Copper, crucible	18 00	18 00	
Copper, heavy	18 00	18 00	
Copper wire	18 00	18 00	
No. 1 machine composition	16 50	16 75	
New brass cuttings	13 00	10 75	
Red brass cuttings	14 50	14 75	
Yellow brass turnings	9 00	9 00	
Light brass	7 50	7 00	
Medium brass	9 00	7 75	
Scrap zinc	6 00	6 00	
Heavy lead	5 00	5 25	
Tea lead	3 75	3 50	
Aluminum	18 00	18 00	
Heavy melting steel	13 50	13 50	
Boiler plate	13 50	11 00	
Axles (wrought iron)	20 00	20 00	
Rails	14 50	13 50	
Malleable scrap	15 00	17 00	
No. 1 machine cast iron	21 00	18 00	
Pipe, wrought	10 00	5 00	
Car wheels	20 00	20 00	
Steel axles	20 00	20 00	
Mach. shop turnings	6 00	6 00	
Stove plate	15 00	13 00	
Cast boring	7 00	8 00	

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ¾" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ¾" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10

Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	\$0 75
Nuts, square, tapped	1 00
Nuts, hex., blank	1 00
Nuts, hex., tapped	1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	\$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	\$1 00
Cold pressed nuts over 1½ in.	2 00

BILLETS

	Per gross ton
Bessemer billets	\$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	\$4 70
Cut nails	4 75
Miscellaneous wire nails60%
Spikes, ¾ in. and larger	\$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net
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MISCELLANEOUS

Solder, strictly	\$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50

Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks, list plus	10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus 10 to	40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto	

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15½c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	\$ 6 55	\$ 6 25
Sheets, black, No. 10	5 15	5 25
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10½ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28		
Premier, No. 28 U.S.		7 75
Premier, 10½ oz.		8 05
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., \$13.00; 5-16, \$11.00; ¾ in.,

\$10.00; 7-16 in., \$9.80; ¾ in., \$9.75; ¾ in., \$9.20; ¾ in., \$9.30; ¾ in., \$9.50; 1 in., \$9.10; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80.

ELECTRIC WELD COIL CHAIN B.B.

½ in., \$16.75; 3-16 in., \$15.40; ¾ in., \$13.00; 5-16 in., \$11.00; ¾ in., \$10.00; 7-16 in., \$9.80; ½ in., \$9.75; ¾ in., \$9.50; ¾ in., \$9.30.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lap-welded
1 in.	\$27 00	\$.
1¼ in.	29 00	26 00
1½ in.	29 50	26 00
1¾ in.	32 00	26 00
2 in.	31 00	26 00
2¼ in.	35 00	28 00
2½ in.	43 00	32 00
3 in.	48 00	40 00
3½ in.		41 00
3¾ in.	60 00	42 00
4 in.	75 00	56 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	22½
Palacine	25½
Machine oil, per gal.	36
Black oil, per gal.	16
Cylinder oil, Capital	62
Cylinder oil, Acme	45
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	\$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	8

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	\$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	1 00
Polishing wheels, bull-neck	2 25
Emery in kegs, American	06
Pumice, ground	06
Emery blue	35
Tripoli composition	09
Crocus composition	12
Emery composition	10
Rouge, silver	50
Rouge, powder, nickel	45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod 0 34

Brass sheets, 24 gauge and heavier, base \$0 42
Brass tubing, seamless 0 46
Copper tubing, seamless 0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	\$42 50	\$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6x4 base	45 00	44 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	\$10 25	\$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50
Cut sheets, ½c per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS

Acid, boracic	\$.25
Acid, hydrochloric	.04
Acid, nitric	.10
Acid, sulphuric	.04
Ammonia, aqua	.13
Ammonium carbonate	.20
Ammonium chloride	.22
Ammonium hydrosulphuret	.50
Ammonium sulphate	.30
Arsenic, white	.14
Copper, carbonate, anhy.	.41
Copper, sulphate	.16
Cobalt, sulphate	.20
Iron perchloride	.62
Lead acetate	.30
Nickel ammonium sulphate	.16
Nickel carbonate	.32
Nickel sulphate	.18½
Potassium carbonate	.50
Potassium sulphide (substitute)	.42
Silver chloride (per oz.)	1.25
Silver nitrate (per oz.)	1.20
Sodium bisulphate	.18
Sodium carbonate crystals	.06
Sodium cyanide, 127-130%	.38
Sodium hyposulphite per 100 lbs	8.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.30
Zinc sulphate	.08

Prices per lb. unless otherwise stated

and Tube at Youngstown, La Belle at Steubenville, and Wheeling Steel and Iron at Wheeling. Mark at Chicago is producing little, while Spang, Chalfant and Company, Pittsburgh, were closed for a few days, though now operating moderately well. Of all the major independents, Jones & Laughlin alone have done well; National has its Riverside works; Wheeling, down tight, is operating full at Lorain, O., and moderately well at McKeesport, Pa., while one of its two Pittsburgh mills was down for a short time and is now operating only in part, the other city mill being reported in regular operation.

Steel mills report that their customers continue to show the greatest spirit of sympathy and co-operation and exhibit no tendency to bother them for deliveries, even though material may be badly needed.

PIG IRON TRADE

The strike has caused a demand for spot iron, and also the withdrawal of most of the offers of 1920 iron. The enquiry for iron for 1920 shipment is increasing steadily, and customers are asking for notification as soon as makers can supply them. Following are reports from various U. S. points:—

Boston.—New England conditions have been affected by the strike, a large falling off in sales having resulted. Offers of 1920 iron on this market have been almost entirely withdrawn. Furnaces in Eastern Pennsylvania have not been affected.

New York.—While enquiry for 1920 delivery is increasing, furnaces are not taking any orders as yet. They are waiting until the strike has come to an end before committing themselves. Most of the business done has been in foundry iron for immediate delivery and nearby shipment.

Pittsburgh.—Foundry grades are supplying the only business in this district. Some of the steel makers whose stacks are banked through want of common labor are said to be looking round for basic and bessemer. Enquiries for 5,000 tons foundry iron are reported by one maker:

Cleveland.—The strike has caused brisk demand for spot iron, and premiums have been paid for this class of business. Southern Ohio iron has been sold for the equivalent of \$32.25, delivered, which represents a premium of \$2 to \$3.50 over the market. Car shortages are causing difficulty in delivery. There has been a small amount of 1920 business placed.

Cincinnati.—Foundry iron for immediate shipment to nearby points is finding a ready sale. Territory usually supplied by lake furnaces is being sold from here. Spot iron is commanding \$28, and next year's iron seems to have been placed at a minimum of \$30.

St. Louis.—Foundries and mills are operating pretty much as usual in this district, the strike not having affected them much. The demand for prompt shipment iron is better than has been the case for a long time. 1920 orders are not figuring in the business closed.

Birmingham.—Production in the south is increasing. The attempt at a strike of southern iron and steel workers proved abortive. Prices are firm on a basis of \$28 for No. 2 foundry, and there is a steady demand.

Chicago.—Merchant stacks are completely tied up, and although melters are pretty well supplied for their immediate wants, prompt iron from east and south is being readily bought. This iron is bringing higher prices than has been paid for local iron, due to it being already on cars, ready for immediate movement.

U.S. SCRAP METAL

The scrap market is marking time, and while some districts report a better demand, in others buying is at a standstill. Following are reports from U. S. points:

Chicago.—While scrap suitable for open hearth mills is not moving, rerolling rails and rolling mill grades are in better demand. The strike having affected pig iron deliveries, foundries are taking all the cast iron scrap they can get. Railroad offerings are small.

Boston.—Although heavy melting prices are low, dealers are not buying. There is no demand from steel makers for grades used by them. Machinery No. 1 scrap has receded from

the high level of last week but is still in strong demand.

New York.—With trading very light, the tone of the market is becoming a little firmer. The best demand is for borings, turnings and cast scrap. No. 1 heavy cast is quoted at \$21.50 to \$22, and No. 1 machinery cast at \$22.50 to \$23.

Philadelphia.—The strike has affected the scrap business, but demand for most grades is improving. Rolling mills have been looking for railroad wrought, but in heavy melting and similar grades there is little doing.

Pittsburgh.—There is little doing in any grades, and prices may be looked on as nominal. What movement there is in foundry grades. Steel manufacturers are asking for suspension of shipments against contracts.

Buffalo.—Scrap dealers are sitting down and waiting for normal times to come again. Few mills are operating and these seem to have enough stock to carry them on. With all the handicaps, prices continue firm.

Cleveland.—There is practically a total cessation of activity in the scrap business here. Not for years have things been as dull as during the past week. Prices remain unchanged, for the reason that there has been no sale to change them.

Cincinnati.—There is in this district also the "nothing doing" sign displayed. A little foundry scrap has been moved, but otherwise the market is lifeless.

St. Louis.—No trading and a decidedly pessimistic feeling is prevalent in the market here. Mills have not been directly affected by the strike, but there is so much uncertainty that every one is waiting for developments.

SETTLEMENT OF CANCELLED CLAIMS IS NOT PROCEEDING VERY RAPIDLY

By Resident Correspondent.

OTTAWA.—Jos. Archambault, member for Chambly-Vercheres, had some interesting questions on the order paper this week, but he did not get a chance to put them. The Speaker appeared to be under the impression that they were not permissible as not being so much questions as statements. Mr. Archambault therefore temporarily withdrew them, though he protests that he does not see how they could be put in any other form to convey the data for the information he requires, and will consult an expert on procedure before returning to the endeavor to secure information.

The questions were as follows:

1. Is the Government aware that the War Secretary of the United States, Newton D. Baker, has appointed two American officers, called Assessors for the Canadian Contracts, to sit on the Imperial Board of Munitions and concur in the decisions of the said board in the settlement of the claims of Canadian contractors with the Government of the United States?

2. Is the Government aware of the predicament of the Canadian contractors by the fact that about \$15,000,000 of these claims, consisting in disbursements and damages is not paid to them, although the Board of Imperial Munitions has declared and judged these claims to be just and reasonable, the recommendation of payment being stopped because the American officers do not concur in the award of the Imperial Board of Munitions, and would like to settle with the Canadian contractors at 50 per cent. discount?

3. Is the Government aware of the fact that, notwithstanding that the offer of the American officers is found unjust and unreasonable, the Imperial Board of Munitions refuses to come to the aid of the Canadian contractors in giving their decision to the Secretary of War of the United States, and for some unexplainable reason they advise the Canadian

Continued on page 60

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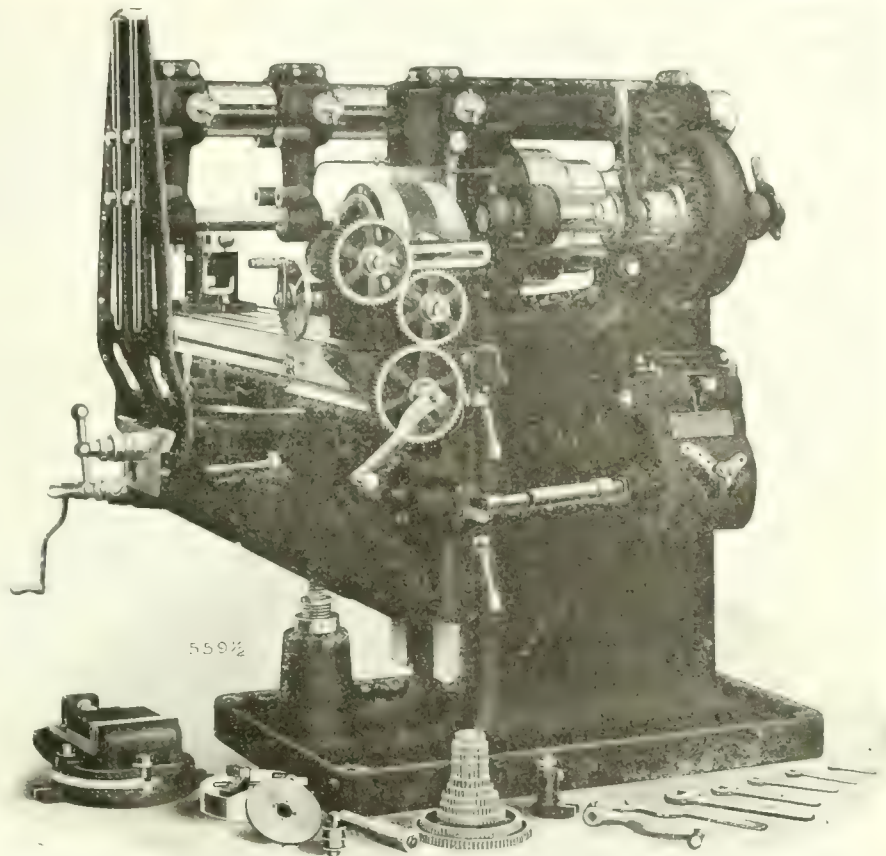
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SETTLEMENT OF CANCELLED CLAIMS

Continued from page 286

contractors to accept the offer of the American officers?

4. Is the Government aware that the large amount of \$15,000,000 which is kept back since nearly 11 months is equivalent to a loan to the United States, and that its unjust retention threatens to ruin certain Canadian industries?

5. Is it the intention of the Government, in view of these facts, to leave their constituents at the mercy of these two American Officers, or are they not of the opinion that they should intervene immediately to the Imperial Board of Munitions to force them to protect the Canadian contractors and to report forthwith their decision to the Secretary of War, Baker?

The questions would form the basis for a speech in the House, in all probability, in which it is said Mr. Archambault would point out that Canadian munition manufacturers are being sacrificed by the Munitions Board, and it is more than likely that Sir Joseph Flavelle, of that board would be brought into the matter and have the blame laid at his door. The complaint voiced by the member for Chambly is that Sir Joseph Flavelle agrees that the claims of the Canadian manufacturers against the United States is just and reasonable, but that he refuses to become its active advocate and advises them to settle rather than go to law, whereas if he exerted his influence, as he might reasonably be expected to do, a settlement would easily be effected. It is also claimed that the American officers concerned do not represent the views of their Government, but are merely trying to secure little personal kudos by squeezing the Canadian manufacturer.

If Mr. Archambault can get past the Speaker with his question in some other form, the whole matter is likely to come up in the House.

Sir Joseph Flavelle does not care to speak for publication, beyond saying that he considers "substantial justice" is being done to the claims. There were some 330 of these, and but 25 remain. But in these 25 there is an amount involved greater than in the 305 that have been settled.

Having Some Difficulty

The statement has been made that in some cases the manufacturers are urged by their bankers to take what they can get, even a fifty per cent. settlement. CANADIAN MACHINERY discussed this with the financial man of one firm that had large contracts cancelled. He admitted that there had been considerable trouble from the start in the making out of the claims. This work had to be done over to meet certain requirements insisted on by the Ordnance Department. As to the work now, there is no fifty-fifty settlement basis. Items are either thrown out or conceded. "The trouble is," continued our informant, "the representatives of the U. S. Ordnance Department do not understand the situation as did the late Colonel Albee, who

had charge of the U. S. office here during the period of manufacture. He knew just what was being done to speed up the production of munitions, and was thoroughly familiar with each plant that had a contract from Washington. His

removal by death has been a serious matter for the Canadian manufacturer. The men in charge now know only the details of making a settlement, and little or nothing of the conditions that existed during the turning out of the material."

CANADIAN MANUFACTURERS ON A TRIP TO THE MARITIME PROVINCES

Special to CANADIAN MACHINERY.

ST. JOHN, N.B.—A party of members of the Canadian Manufacturers' Association has been visiting New Brunswick and has been well entertained in Fredericton, Moncton and St. John. They were received by civic officials and manufacturers and conducted on motor trips about the cities, visiting objects of interest and manufacturing plants, and being honored with banquets in different places. In the party were: T. P. Howard, of the Phoenix Bridge and Iron Works, Montreal, president; W. S. Fisher, Emerson and Fisher, Ltd., St. John; W. H. Shapley, Sterling Action and Keys Ltd., Toronto; J. T. Cumming, of Jas. W. Cumming & Son, New Glasgow, N. S.; A. D. Ganong, Ganong Bros., St. Stephen, N.B.; R. H. McKay, of McKay & Fraser, New Glasgow, N.S.; G. W. Fleming, Phoenix Foundry, St. John, N.B.; H. R. Thompson, secretary Maritime division, C.M.A., Amherst, N.S.; J. T. Stirrett, general secretary, C.M.A., Toronto; J. R. K. Bristol, manager tariff department, C. M. A., Toronto; J. E. Walsh, general manager, C.M.A., Toronto; Joseph Picard, of the Rock City Tobacco Co., Ltd., Quebec; F. W. Stewart, Cluett, Peabody & Co., Montreal; P. E. Joubert, Lamontagne Ltd., Montreal; G. W. McKinnon, McKinnon Steel Co., Sherbrooke; M. R. Meldrum, Herbert Morris, Crane and Hoist Co., Niagara Falls; G. H. Douglas, Thornton & Douglas, Hamilton; H. W. Fleury, J. Fleury's Sons, Aurora; H. A. Telfer, Telfer Mfg. Co., Toronto; S. Harris Lithographing Co., Toronto; A. L. Fowler, Fowler Milling Co., St. John; C. S. Christie, Christie Woodworking Co., St. John; R. A. McAvity, T. McAvity & Sons, St. John; Lewis Connors, Connors Bros., St. John; Cheslie Peters, C. H. Peters Sons, St. John; A. L. Foster, T. S. Simms & Co., St. John; J. D. Palmer, Hartt Boot & Shoe Co., Fredericton; W. F. Knoll, James Pender & Co., Ltd., St. John; Alex. Wilson, Wilson Box Co., St. John; W. A. Christie, Christie Bros. & Co., Amherst, N.S., and R. E. Dickie, Stewiacke, N.S. All these were present at a banquet tendered in the Union Club, St. John, during the visit of the outside members.

It is expected that much good will follow from a trading and industrial viewpoint from the visit of the Upper Canadian manufacturers to these provinces. At the first day's gathering in St. John, many matters of interest were discussed and among the keynotes sounded were that there was an awakening of a broader

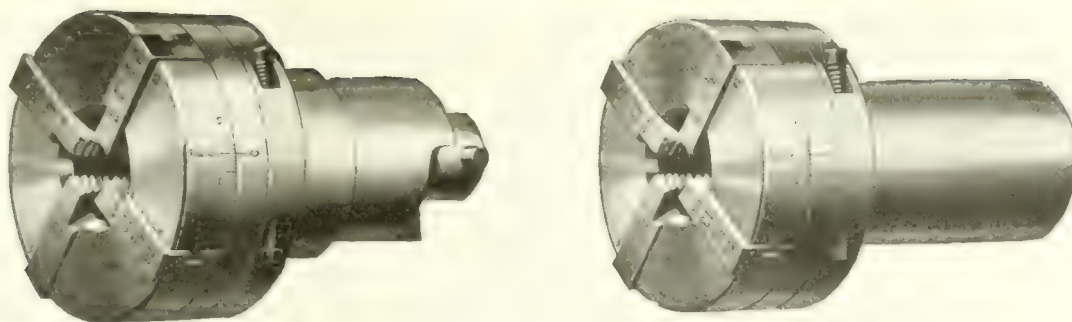
spirit of friendliness between the manufacturers of Canada, East and West, and that the people of Ontario and other provinces should visit the East more frequently with the idea of a fuller study of problems existing here in order that industry might benefit and the future expansion of the Dominion be promoted. One of the chief objects accomplished by the gatherings in Fredericton, Moncton and St. John, was that local representatives were brought in more intimate association with those from the head offices for the discussion of mutually important questions, previously done by mail. The gathering was so arranged as to time with the meeting of the Maritime Province division in St. John.

The delegates were welcomed to the city by Mayor Hayes and R. B. Emerson, president of the Board of Trade. In the afternoon they were taken for a cruise around the harbor in ideal weather, while in the evening the banquet already referred to was held at the Union Club, at which Mr. Fisher presided. He made an opening address in which he referred to the importance of the association from the viewpoint of the Canadian manufacturer, and urged the extension of its activities to promote Canadian business and to bring about a greater growth of industry.

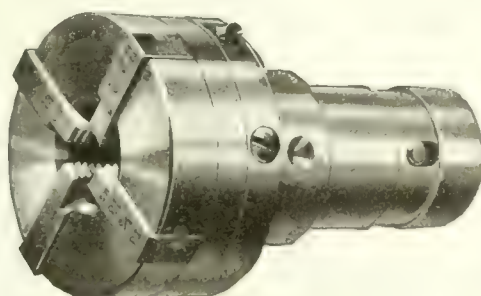
The sessions of the Maritime Manufacturers' Association held in St. John, were presided over by R. H. McKay, New Glasgow, N.S. One of the chief features discussed was the development of power in New Brunswick and Nova Scotia. It was the general opinion that steps should be immediately taken in harnessing the water power of both provinces and conserving the coal supply. Committees were appointed to investigate the matter and take up with the respective legislatures the development of power.

Lewis W. Simms, president of T. S. Simms & Co., St. John, returned home this week after a visit to Oklahoma, where he was buying stock.

Philadelphia.—Furnaces are still unwilling to quote on next year iron. Makers having iron on stock are due to the strike situation, are able to get from \$29 to \$30.25 for No. 2X iron. Fair business in foundry iron is being done. The basic situation has been changed due to large purchases of this grade by a large interest, which closed orders for 45,000 tons at an average rate of \$27.50 delivered Pencoyd.



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MONTREAL NOTES

At the October meeting of the Canadian Railway Club, which will be held at the Windsor Hotel on the evening of the 14th, the subject will be Competition, Combination, and Co-operation, and will take the form of a lecture by Major S. T. Robins, general manager of the Dearborn Chemical Company.

Following a shut-down of nearly a month, the Sydney plant of the Dominion Iron and Steel Co. has commenced operations on single shift, and it is anticipated that regular work will be resumed in the very near future. For some time prior to the closing down of these works the orders had been falling off, and economic operations of the plant was deemed impossible.

Preferential consideration in the high cost of living is granted to few. Owing to the increased cost of operation and maintenance the Montreal Chambre de Commerce has practically decided to amend the constitution, to raise the admission fee from \$5 to \$10, with a similar advance in the annual fee for active members, and to corresponding members the fee will be \$5 in place of \$2, as formerly.

Substantial gains have been made in the grain shipments through the Lachine Canal, for the month of September, over that for the corresponding month last year. The figures are 3,604,638 bushels, this representing an increase of over two millions over September of last year. Two-thirds of the grain shipped was in wheat, the total being 2,155,254 bushels. So far this year the grain passage through the Canal has been close to 18,000,000 bushels.

J. M. Rosevear, who has been general auditor of the Grand Trunk and Grand Trunk Pacific for the past year, has been appointed comptroller of the company, superseding W. H. Ardley, retired. Mr. Rosevear entered the services of the Grand Trunk in 1897 as a clerk in the office of the auditor of disbursements. He was appointed travelling accountant in 1904, and chief clerk in 1906. He was appointed auditor of disbursements for the entire system in 1908, retaining this position for ten years.

Winter regulations are now effective in the port of Montreal. On the first of October the "winter mark" ruling came into force, so that vessels will carry less cargo than during the summer months. This is necessary owing to the heavy weather that may be encountered from now on. On ocean-going vessels there are three marks, showing to what depth a vessel may be loaded; one for summer, one for fall and one for the winter season, the last allowing for the lighter cargoes.

While no definite announcement has been made, it is learned that P. Lyall and Son of Montreal will shortly engage in the manufacture of automobiles. For the past year the engineers of the company have been designing and experimenting on a new type of internal combustion engine, and, according to official statements, tests have been made that establish its superiority over similar engines now in service. The post-war activities of this company also include the perfection of a special chuck for general industrial purposes, a product that has been developed from those designed and constructed by the engineering staff during the war.

The practice of coaling Transatlantic steamers on this side, for the return trip, has become additionally pronounced during the past couple of weeks, owing to the serious character of the industrial situation in England. However, this condition will probably be remedied in the near future, as the latest reports are to the effect that an agreement has been reached between the striking railroad men and the Government, whereby they will return to work while negotiations are carried on. For some time past the congestion of the docks on the other side have become so great that restrictions in shipping have been very necessary. From now on it is expected that relief will be shown in this connection.

J. W. Norcross, president of the Canada Steamship Lines, has recently returned from Europe, and is very optimistic regarding the shipping activities, both of this and other countries. He states that British and French shipping interests anticipate a period of several years of continued favorable conditions as exist at the present time. Of his own direct interests Mr. Norcross stated, "Developments that have already occurred in the Atlantic business of the Canada Steamship Lines have more than justified this, and important extensions and improvements are now being contemplated." He looks for considerable emigration from the British Isles to Canada during the coming year, and appreciates the fact that shipbuilding and industry in general will greatly benefit by the additional skilled labor that will be available.

Some idea of the changing conditions that are taking place in world commerce may be gathered from the export of coal that has recently taken place from this country. While this state of affairs is largely due to the recent attitude of British labor, there is nevertheless a possibility that trade of this kind may be permanent in character. The steamer *Ariant*, recently arrived at Halifax with a general cargo, has been diverted from her regular activities and will take on a cargo of coal at Sydney for the United Kingdom. Another instance of coal trading is the shipments of fuel that are

now going to Holland. Some time ago the Netherlands Government obtained some 90,000 tons of Canadian coal, and and it has been announced that the Dutch Government are so well pleased with the quality of the coal that a further order for upwards of 200,000 tons has been placed.

AMERICAN BUREAU OF SHIPPING APPROVES THERMIT WELDING FOR MARINE REPAIRS

An important development of Thermit welding in American shipyards is anticipated by the recent approval by the American Bureau of Shipping of the Thermit process for welding stern frames, rudder frames, and other heavy sections on ships registered under their classification. The only qualification is that this bureau be notified sufficiently in advance to have a surveyor in attendance during the welding operation as well as to inspect and test the weld when completed.

While the Thermit process has been used since 1903 for making marine repairs, and has had a great many successful welds of this nature to its credit, the process was never officially approved by the American Bureau of Shipping, and most of the repairs were made on vessels not classed by them. It is due entirely to the unbroken record of successful marine welds that the bureau now accords its official sanction to the process. According to a statement by the Metal & Thermit Corporation, there has never been a single failure of a Thermit marine weld so far as it has been able to ascertain in all the years that the process has been used under this company's jurisdiction.

Now that the United States promises to have one of the largest mercantile marines in the world, and as practically all of the ships which have recently been constructed, and which will be constructed in the future, will be registered with the American Bureau of Shipping, the recognition of the Thermit process by that bureau bids fair to result in many important Thermit marine welds from now on.

Fire at Ingersoll.—Damage was caused by fire to the roof of the moulding shop of the T. E. Bissell factory. The fire started near a small cupola, the roof of which, as well as the centre section of the moulding shop, was completely destroyed. There had been a heavy cast in the moulding shop in the morning, but the moulders had the afternoon off. The fire had evidently been smouldering for some time before it burst through the roof and was discovered. The loss will probably exceed \$2,000, while the delay of several weeks which will necessarily follow will also be serious, as the firm has large orders which will keep the moulding shop running for several months. The building is owned by the John Morrow Company, and the loss is covered by insurance.



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MARINE

Port Arthur.—The largest grain cargo ever carried on the Great Lakes was cleared for Port McNicoll in the W. Grant Morden, a Port Arthur-built vessel. The cargo consisted of 503,153½

bushels of wheat, the value of which was \$1,150,000.

Vancouver.—The steamer "War Melody" has been purchased by the Robert Dollar Company and renamed Grace Dollar. She is now loading coal at Norfolk for San Francisco. She is expected to leave San Francisco for the Orient under command of Captain Abernethy about October 20.

Sault Ste. Marie.—The large Sabin lock on the Soo Canal was opened with appropriate ceremonies on Sept. 18th. The new lock cost \$3,000,000, and was six years in building. The addition of this lock brings the total number up to

five, four American and one Canadian, and these locks together are capable of handling any fleet that may assemble at the St. Mary's river.

St. Thomas.—A new steamship service has been inaugurated between Cleveland and Port Stanley, by the Pere Marquette No. 8, a combined passenger and freight steamer. She will be operated by the Cleveland Erieau Steamship Co. and will give a tri-weekly service. She has accommodation for 60 passengers and large freight capacity. The service will be continued until December 1.

New York.—The White Star line has been allotted the former North German Lloyd liner Prinz Frederick Wilhelm, and will use her on the New York, Cherbourg and Southampton route. She has been in use for repatriating American troops, and was blockaded in Hamburg during the war. The reparation committee of the Inter Allied council at Paris assigned the vessel to the British Government, who in turn advised the White Star line to take the vessel.

Watertown, N.Y.—The barge Hilda, owned by the Montreal Transportation Company, which parted company with the tug Thompson during a heavy gale in Lake Ontario Wednesday, the whereabouts of which has been a mystery since she separated from the tug, has been located ashore at Stony Point, four miles from Henderson Harbor. The Donnelly Wrecking Company of Kingston, Ontario, is to-day at work trying to release her. The Hilda has seven feet of water in her hold. She is loaded with 35,000 bushels of wheat, and was bound from Buffalo to Montreal.

TRADE GOSSIP

New Building for O. A. College.—P. H. Secord & Co., of Brantford, Toronto, Hamilton and Brantford, have secured the contract to erect the new apiary building at the Ontario Agricultural College. The building will be of brick with stone foundation and will cost \$40,000.

Company Gets Notice to Move.—The Corporation of Windsor have served notice to vacate city property on the Lamb Railway Service Corporation. The ratepayers recently voted against granting the company a bonus, including the purchase of land in the factory district. The company, who expected a favorable vote, had already commenced the erection of the factory.

Tin Plate in Demand.—There is a large demand for tin plate in Japan and it is necessary to import the product as it cannot be produced profitably in that country. Most of the plate was imported from the United States, and in 1916 amounted to 65,000 pounds. It dropped in succeeding years to 45,000 pounds, but since the signing of the armistice the imports have not been sufficient to supply the demand.



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Ferro-Chrome in France.—The following statement regarding the production of ferro-chrome in France has been received from the office of the Commissioner General of Canada in France. Having received a letter asking what market there would be in France for Canadian ferro-chrome, inquiry was made. The Ministère de la Reconstitution Industrielle (Direction des Matières Premières), 74 Avenue des Champs-Élysées, Paris, made the following statement: "I beg to inform you that France has always been an exporter of ferro-chrome, both ordinary and refined, the production of its factories greatly exceeding the national consumption. Our electro-metallurgical works also manufacture the other ferro-alloys (tungsten, molybdenum, nickel, etc), in sufficient quantities."

Machinery Requirements of Poland.—

A recent bulletin of the Polish Commercial and Industrial Bureau in New York, contains some detailed data relative to the approximate quantities of agricultural machinery urgently needed in Poland. The Bureau hopes to arrange loans and credits to meet the purchases of raw and manufactured materials which Polish importers and the Polish Government expect to make in the United States. We print below the data referred to above: Tractors, 1,500, with repair parts and suitable repairing tools; ploughs, 150,000, suitable for a light soil; harrows, 3,000, complete, of iron, also iron parts for 15,000 more to be made of wood; rollers, 500, with discs, also sufficient iron rollers to be used for construction of wooden framed rollers; sowers, 3,000, complete (1,000 each for motor, horse, and hand operation); cultivators, dusters, rakes, diggers of all systems—3,000; hay mowers, 6,000; hay baling machines (150 motor and 900 hand driven); ordinary harvesters, 6,000; binders, 3,000; threshers, 750 (steam driven), 1,500 (gasoline driven), 3,000 (horse driven); separators and blowers, with sufficient number of reserve sieves, 3,000, also metal parts for the construction of 3,000 additional blowers, to be made in Poland; corn graders of various types, 1,000. Scythes, sickles, whetstones: Scythes, 300,000; sickles, 150,000; whetstones, 300,000. Small tools: Hoes, 300,000; picks, 150,000; shovels, 300,000; spades, 300,000; axes, 150,000; mattocks, 50,000. These should be of various sizes and without handles. Heavy wagons for oxen and horses; iron tires, etc., for 300,000 wagons and ready-made wheels for 30,000 wagons. Sprays, bellows, sulphur, copper and raffia: Sprays, 90,000; bellows, 15,000; sulphur, 700,000 pounds; copper sulphate, 1,200,000 pounds; raffia, 1,200,000 pounds. Axes of various sizes, 18,000. Hand-saws (both rip and cross-cut saws): 55-inch, 300; 60-inch, 3,000; smaller, 3,000. Files of different sizes, 1,200 dozen; rasps of different sizes, 1,500 dozen; spike hammers (41-lb.), 1,500 units; hammers (8-lb.), 1,500; picks, 3,000; shovels, 400; spades, 900; hoes, 900; chains, 600; large chains with spike and hooks, 150.

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Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
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One Oliver Tool Room Lathe, 16 in. by 7 ft. bed, complete with taper attachment, relieving attachment, chuck, etc., hollow spindle, double back gear, large and small face plate and steady rest, in perfect condition.

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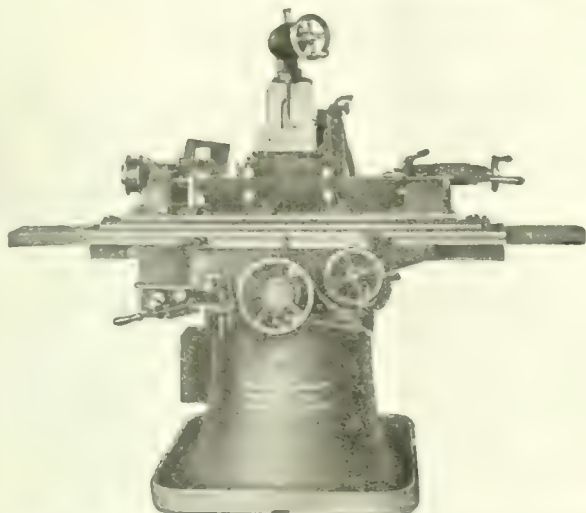
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Canadian Machinery and Manufacturing News
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Is the Alien a Menace?

IN the October issue of MACLEAN'S MAGAZINE a strong presentation is made of the reason why the people of the West are against further foreign immigration.

"The Menace of the Alien" depicts the foreign problem in the Canadian West as it exists to-day, and shows every one of us why we must Canadianize our Ruthenians, Austrians, Slovaks, and our fifty-seven other varieties before we allow any further "unrestricted" immigration.

This article is written by a member of MACLEAN'S MAGAZINE staff who has just returned from a careful, personal investigation of the situation. Shall we have a "White West?" Many Westerners are demanding it. Are the aliens to swing labor into the bosom of the O.B.U.? It is being done—and what must we do to stop it?

The "inside" story of the routing of the Drumheller miner aliens by returned Canadian war veterans is here told by MACLEAN'S for the first time. What leadership must be substituted for the O.B.U. leadership of these foreigners?

The October issue of MACLEAN'S is a Western number in the sense that it contains many articles and stories of distinctly Western interest. For instance:

X "Those Pesky Farmers Out West"

By Hopkins Moorhouse, Author of "Deep Furrows"

They have completely upset the old order of things. No longer will politics consist of the comfortable fight between the Ins and Outs with the old party lines maintained. The grain growers on the Prairies have upset the calculations of the professional politicians and completely changed the face of Dominion politics.

X "Fifty Years in the West"

By Professor W. T. Allison

A breezy and readable sketch of the business career of Winnipeg's veteran business man, James H. Ashdown.

"Further Discoveries of New Land"

By Vilhjalmur Stefansson

The final and most interesting instalment of Mr. Stefansson's story of his wonderful trip of five years' duration in the Canadian north in which he tells for the first time of finding new continents in the Arctic and hoisting there the Canadian flag.

X "The Banshee Bell"

By Edith G. Bayne

A bright love story laid in the mountains of British Columbia.

Other Splendid Features of October MacLean's

X "The Turmoil at Ottawa"

By J. K. Munro

A comprehensive survey of Dominion politics, written with complete impartiality and absolute candor. It is bright and breezy, with a knock in every line for the political opportunists. It plucks many tail feathers from our party leaders.

"Spanish Doubloons"

By Camilla Kenyon

The start of a bright and fascinating serial story by a brilliant young writer. It is the Spanish Main brought up-to-date, treasure hunting with a background of fun and romance.

"The Airy Prince"

By Arthur Beverley Baxter

A complete novelette in which is presented a bird's-eye view of England in time of war. It is one of the most brilliant stories that has been written of recent years.

"His Majesty's Well-Beloved"

By Baroness Orczy

The latest novel by this popular authoress appearing exclusively in MACLEAN'S.

"Ebb and Flow"

By C. W. Stephens

A strong business story laid in the province of Quebec.

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The above cut visualizes the great economical possibilities of NATCO Multi-Drillers.

This driller is one of many NATCOS installed in the plant of the Hinkley Motors Corp. It is drilling 38 holes of different diameters in one operation in the bottom of aluminum crank cases.

A patented feature of the NATCO, Independent Change of Speed to each individual spindle, permits drills of various sizes to be driven at approximately their correct cutting speed.

NATCOS are built in 11 sizes, ranging from 2 to 72 spindles.

We also design and build jigs and fixtures for use in connection with NATCO Multi-Drillers.

THE NATIONAL AUTOMATIC TOOL CO.

RICHMOND, INDIANA, U.S.A.

List of NATCO Foreign Agents:

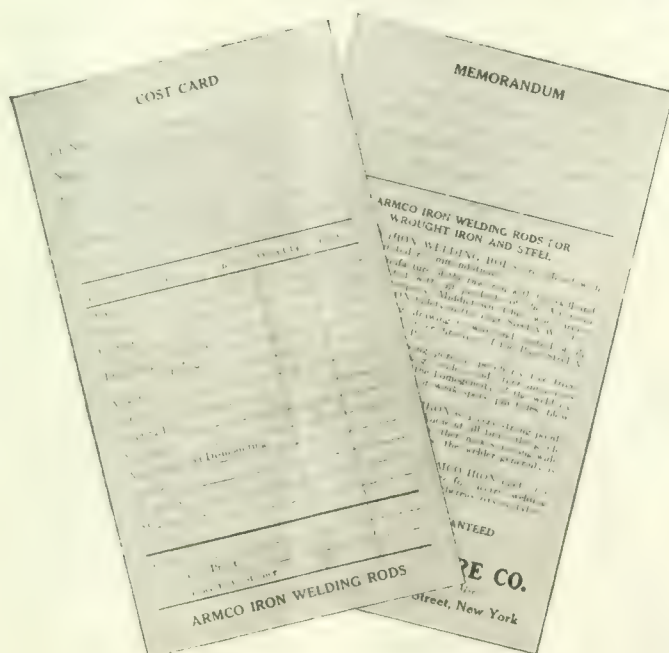
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very convenient and satisfactory record. Any quantity will be furnished on application, without charge.

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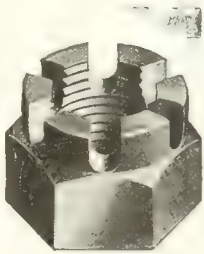
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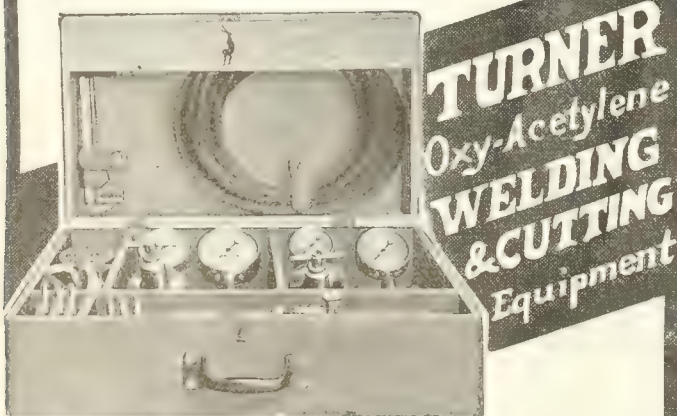
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Six Post Readers in New Cabinet

FORMER Finance Minister Cashen, who, following the crisis which led to the resignation of Premier Lloyd, of Newfoundland, has been called upon to form a Ministry, has already selected nine members to act with him.

Six of these, including the Premier himself, have been regular readers of THE FINANCIAL POST for some time.

This does not only indicate the quality as well as the extent of our circulation, but indicates also that men who carry big responsibilities find THE POST of value to them. It indicates, therefore, the approval which is meeting the effort of our editors and the great importance and value of the business information to which subscribers have access through the columns of THE FINANCIAL POST.

When the Government of Newfoundland was recently arranging the flotation of a \$5,000,000 bond issue THE POST'S opinion as regards some methods of marketing was quoted by members of the Cabinet.

The Financial Post at Ottawa

IN the Dominion House of Commons the other week the attention of the Government was drawn to an article in THE FINANCIAL POST containing a reference to the financing of Roumanian orders through an agency established in London by Sir Clifford Sifton. Sir Thomas White mentioned that in reading his FINANCIAL POST that week, he had formed the opinion that the reference was to private marketing of bonds.

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Specifications:

Spindle 2 3/16" diameter No. 2 or 3 Morse Taper Spindle travel 8 1/2".

All gears accurately cut and fitted.

Carriage wheels equipped with roller bearings.

14" x 14" tight and loose pulleys or single pulley for belt drive to motor, or direct connected to motor.

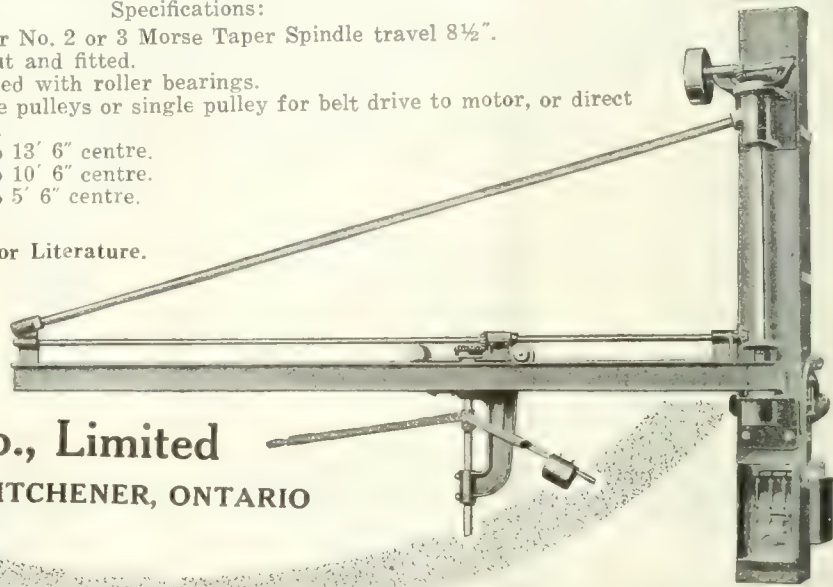
15 ft. Beam will drill to 13' 6" centre.

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Versatility is a strong feature of the LANDIS. Wherever installed, it is always busy. Ask us for full details on this profitable machine.

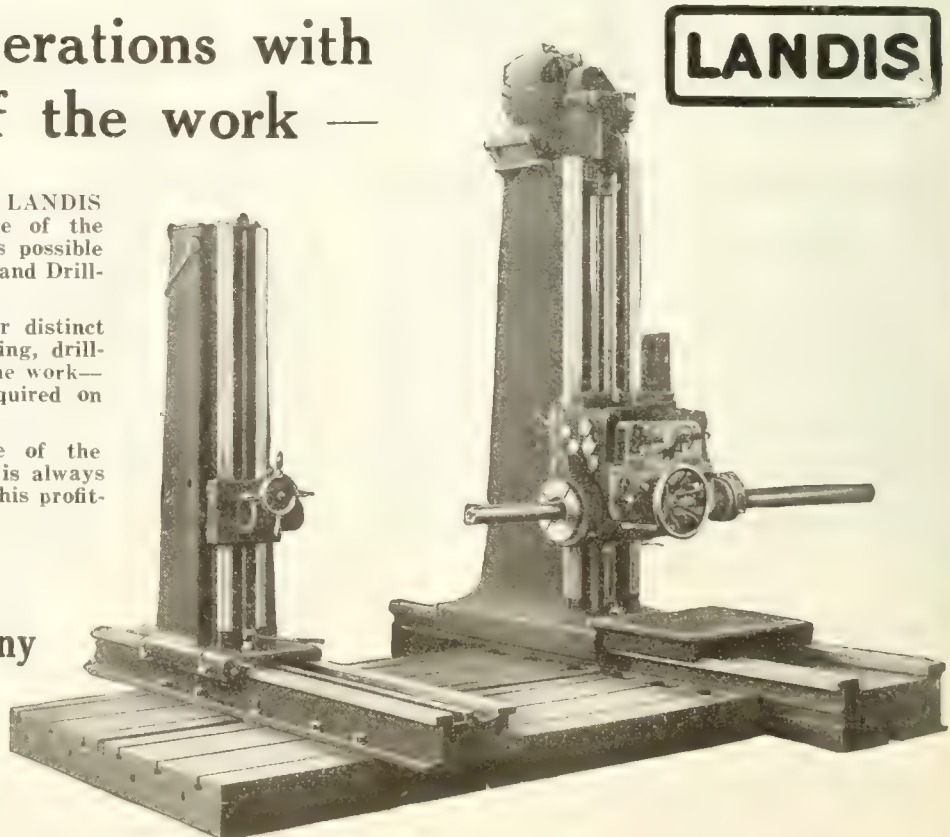
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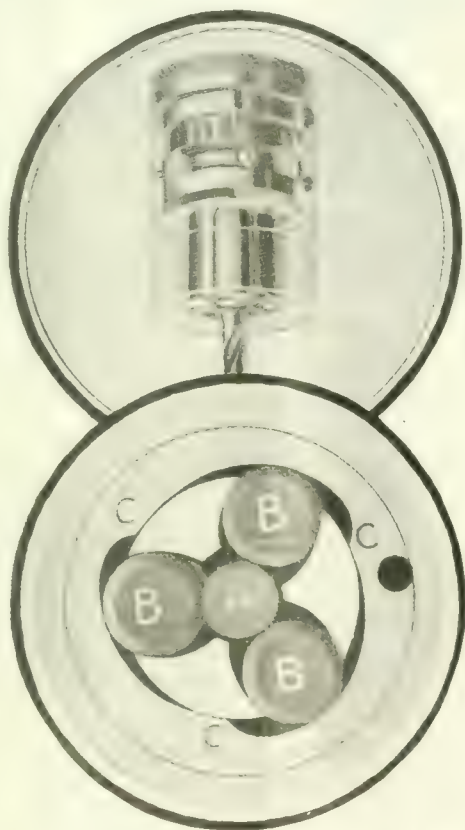
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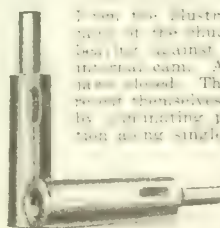


SKF AUTOMATIC-QUICK ACTING SELF CENTERING DRILL CHUCKS

Suggestion →
No. 1



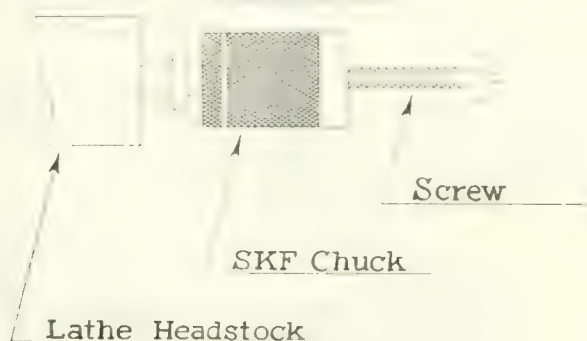
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C Cam Surfaces



Increase Size Range
by using Adapters

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After Slotting



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IT'S just another application of the SKF Chuck. The chuck is mounted on a lathe spindle. Machine screws are inserted in the drill opening, burrs in the screw heads are polished off and screws removed in rapid succession. The threads are not damaged because the smooth roller jaws grip the screws just enough to hold them firm.

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Canada was able to give this credit only because you bought Victory Bonds.

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If Canada is not able to give this credit, other countries will.

Therefore Canada's continued prosperity rests with you.

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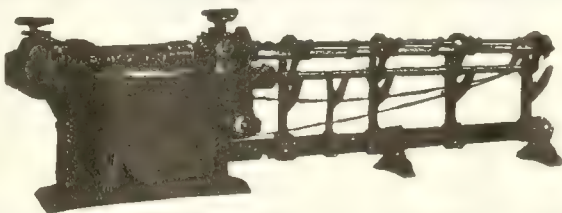
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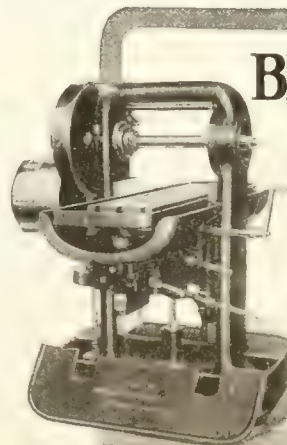
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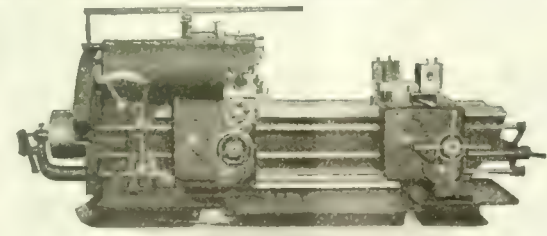
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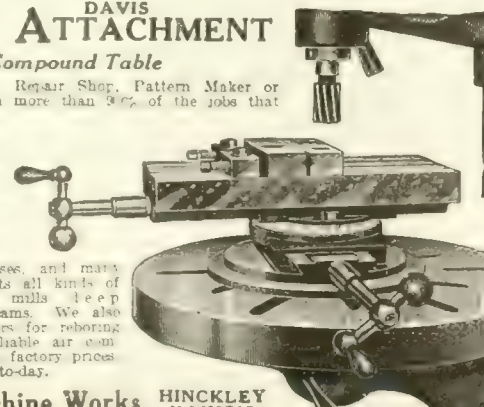
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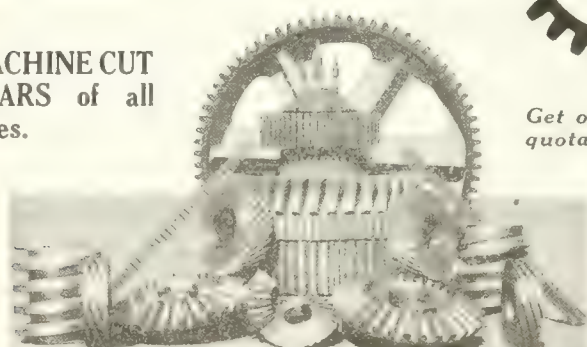
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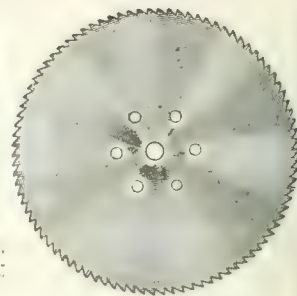
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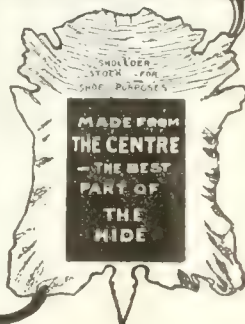
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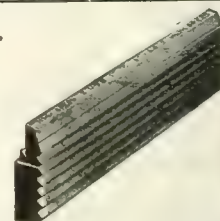
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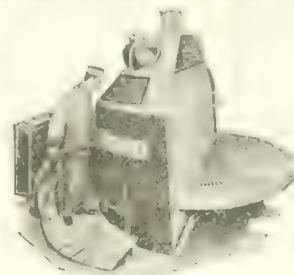
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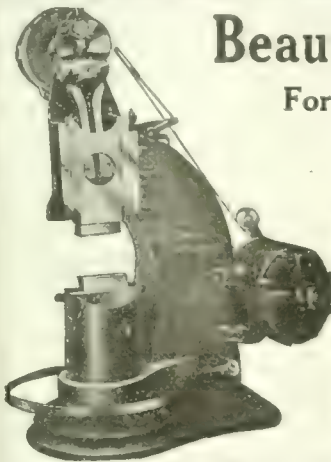
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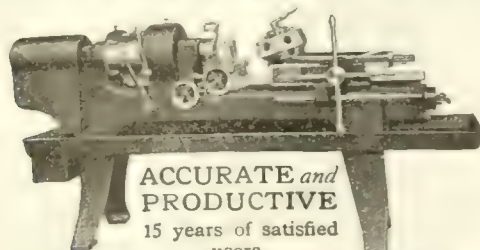
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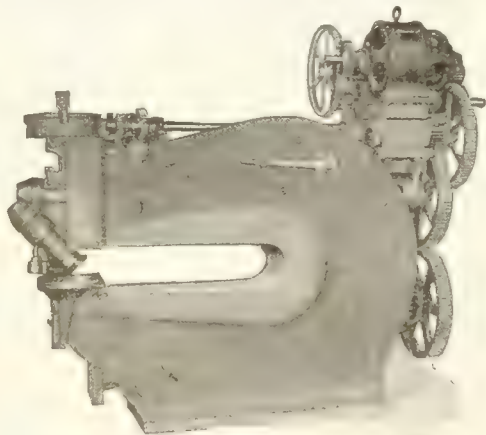
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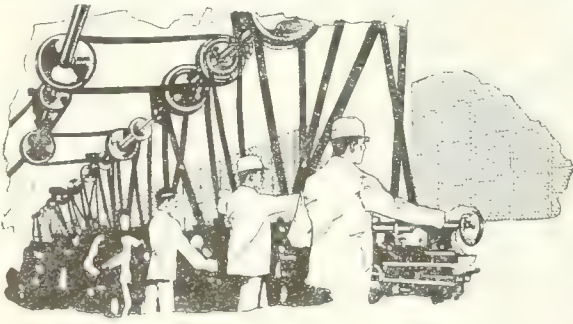
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BELTING, RUBBER

Can. Consolidated Rubber Co., Montreal, Que.

BELTING, CHAIN

Can. Fairbanks-Morse Co., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
L. E. Rose Mfg. & Sply. Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, CONVEYOR

Can. Consolidated Rubber Co., Montreal, Que.
Baker & Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal, Que.
Federal Engineering Co., Ltd., Toronto, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glasco, Montreal, Que.
McLaren Belting Co., J. C., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Plews Ltd., Winnipeg, Man.
R. S. Lewis & Son, Toronto, Ont.
Standard Mach. & Supplies, Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, FRICTION AND SURFACE

Can. Con. Rubber Co., Ltd., Montreal, Que.

BELTING, LEATHER

Can. Graton & Knight Mfg. Co., Montreal, Que.
John Tullis & Son, Glasgow, Scotland.

BELTING, WOVEN

Federal Engineering Co., Ltd., Toronto, Ont.

BENDING ROLLS, FLUTE & AUGER

Wickes Bros., Saginaw, Mich.

BENDING MACHINERY

Bertram, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas, Ont.
Brown-Boggs Co., Ltd., Hamilton, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Garlock-Walker Mach. Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BLASTING MACHINES, SAND

Garlock-Walker Machinery Co., Toronto, Ont.
Jardine & Co., B., & Co., Hespeler, Ont.
National Mach. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

BILLET MARKERS

Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Sweetest Steel & Importing Co., Ltd., Montreal, Que.
Algoma Steel Corp., Sault Ste. Marie, Ont.
Kearney-Elison & Co., Ltd., Montreal, Que.
Marshall, Son & Bunney, Toronto, Ont.
Norton, Ralph B., Agent, Montreal, Que.

BILLETS, FORGING

General Steel Co., Milwaukee, Wis.
Kearney-Elison & Co., Ltd., Montreal, Que.
Norton, Ralph B., Agent, Montreal, Que.

BINS, STEEL

Dennis Wire & Iron Works, London, Ont.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Ont.
Toronto Iron Works Ltd., Toronto, Ont.
William Hamilton Co., Peterboro, Ont.

BLACKSMITH WORK

The Thos. Pink Co., Ltd., Pembroke, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT

Pittsburgh-Castal Steel Co., Pittsburgh, Pa.

BLOOMS AND SLABS

Algoma Steel Corp., Sault Ste. Marie, Ont.

BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal, Que.
McLaren & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

BLOW PIPES AND REGULATORS

Carter & Co., Ltd., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY

Commercial Camera Co., Providence, R.I.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING

Lufkin Rule Co., of Can., Windsor, Ont.

BOARTZ

John Kachel & Co., Inc., New York, N.Y.

BOLT CUTTERS

Greenfield Tap & Die Co., Greenfield, Mass.

BOLT CUTTERS

Fellows Gear Shaper Co., Springfield, Vt.
Greenfield Tap & Die Co., Greenfield, Mass.
Wells Bros. of Can., Ltd., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

BOOKS, TECHNICAL

MacLean Publishing Co., Toronto, Ont.

BOILERS

Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.

BOILER BREECHINGS

William Hamilton Co., Peterboro, Ont.

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Landis Machine Co., Waynesboro, Pa.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
R. S. Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BOLTS

Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Hinge Wks., London, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Rice, Lewis & Son, Toronto, Ont.
Steel Co., of Canada, Ltd., Hamilton, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co., J. H. Brooklyn, N.Y.

BOLTS, COUPLING

Galt Machine Screw Co., Ltd., Galt, Ont.

BOLTS, STAY

Morrow Screw & Nut Co., John, Ingersoll, Ont.

BOLTS, SPRING SHAKLE

Can. Winkley Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.

BOLTS, PATCH

Morrow Screw & Nut Co., John, Ingersoll, Ont.

BOLT AND NUT MACHINERY

Bertram & Sons Co., John, Dundas, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robert, Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto, Ont.

BOLT THREADING MACHINERY

Jardine & Co., Ltd., B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Vicer Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal, Que.
Can. Ingersoll-Rand Co., Sherbrooke, Ont.
Garlock-Walker Mach. Co., Toronto, Ont.

BORING MACHINES, UPRIGHT AND HORIZONTAL

Bertram & Sons Co., John, Dundas, Ont.
Belts Machine Co., Rochester, N.Y.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Mach. Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Hester Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York, N.Y.
Rochester Machine & Tool Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BORING AND TURNING MILLS

Bertram & Sons Co., John, Dundas, Ont.
Belts Machine Co., Rochester, N.Y.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Mach. Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Hester Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

BOXES, CAST IRON
Brown & Sharpe Mfg. Co., Providence, R.I.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland.

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Bogges & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland.

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Peck, Stow & Wilcox Co., Southington, Conn.

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Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Mach'y. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refractories, Montreal.

BRIDGES, RLY. AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

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PLATES**
Brown's Copper & Brass Rolling Mills,
New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills,
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Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton.

BRONZE COPPER
Canada Metal Co., Toronto.

**BUFFING AND POLISHING
MACHINERY**
Ford-Smith Mach. Co., Hamilton.
Foss Mach'y. & S'ply Co., Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert,
Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

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DUMP**
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert,
Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville.

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Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

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Northern Crane Works, Ltd., Walkerville.

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Morrow Screw & Nut Co., John, Ingersoll.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Pansborn Corporation, Hagerstown, Md.
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

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International Machinery & Supply Co.,
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Lufkin Rule Co., of Can., Windsor, Ont.

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Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Bogges & Co., Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBIDE
Unson Carbide Co., Toronto, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville.
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert,
Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor.

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Jones & Glasco, Montreal.

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Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Ltd., Herbert,
Niagara Falls, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

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Algoma Steel Corp., Sault Ste. Marie.
Brookville Foundry Co., Brookville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

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Electric Steel & Metals Co., Welland.

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Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
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Brown & Sharpe Mfg. Co., Providence, R.I.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie.
International Machinery and Supply Co.,
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Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., A., Fortierville, Q.
Brown & Sharpe Mfg. Co., Providence, R.I.
Brown, Bogges Co., Ltd., Hamilton.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
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International Malleable Iron Co., Guelph.
Kennedy & Sons, Ltd., Wm., Owen
Sound.

Katie Foundry, Ltd., Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
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CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.

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Gardner, Robt., & Son, Montreal.

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CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

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Bertram & Sons Co., John, Dundas.
Batterfield & Co., Inc., Rock Island, Que.
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mch. Co., South Sud-
bury, Mass.

Morrow Screw & Nut Co., J., Ingersoll, Ont.
Niles-Bement-Pond Co., New York.
Dunn & Whitney Co., Dundas, Ont.
Wells Bros. Co., of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

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Morris Crane & Hoist Co., Herbert, Nia-
gara Falls, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Mach'y. Co., Toronto.
Morris Crane & Hoist Co., Herbert,
Niagara Falls, Ont.

Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glasco, Montreal, Que.

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Morse Chain Co., Ithaca, New York.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

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Williams & Wilson Ltd., Montreal, Que.

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CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, N.Y.

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Coventry Chain Co., Coventry, England.
Jones & Glasco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

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Taylor, J. A. M., 318 Stair Bldg.,
Toronto, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mach'y. & S'ply Co., G. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Mach'y. Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Hawthings Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
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London, Conn.
Williams & Wilson, Ltd., Montreal, Que.

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AND KEYLESS**

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Whitney Mfg. Co., Hartford, Conn.

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Victor Tool Co., Weynesboro, Pa.

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Herald Machine Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
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Bernard Industrial Co., A., Fortierville, Q.
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Williams & Wilson, Ltd., Montreal, Que.

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Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
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MacKinnon Steel Co., Sherbrooke, Que.
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Williams & Wilson, Ltd., Montreal, Que.

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J. C. Wilson & Co., Belleville, Ont.

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Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

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Hineley Machine Co., Hineley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

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Smalley-General Co., Inc., Bay City,
Mich.

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land, Ont.

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Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

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Whitman & Barnes Co., St. Catharines.

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Morse Twist Drill & Mach. Co., New
Bedford, Mass.

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Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Williams & Wilson, Ltd., Montreal, Que.

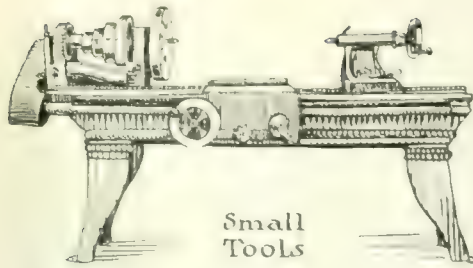
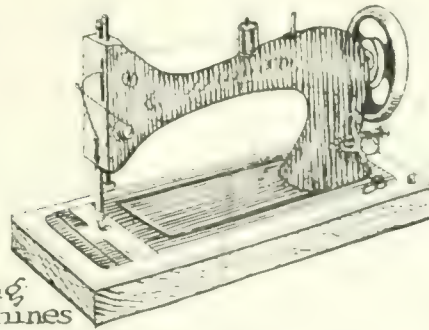
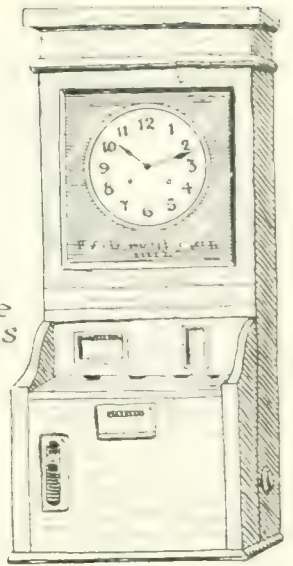
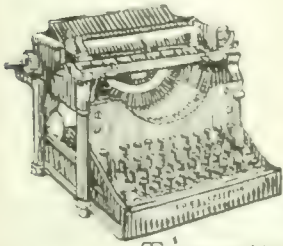
COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville,
Que.

Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd.,
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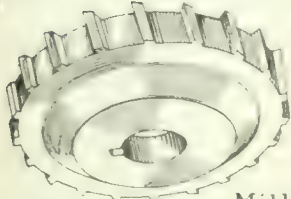
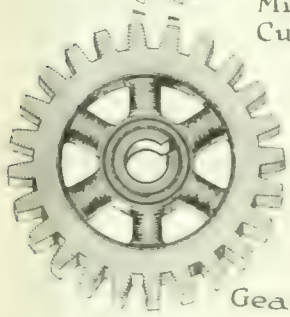
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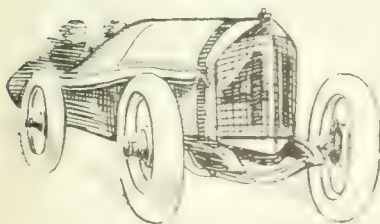
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Milling
Cutters

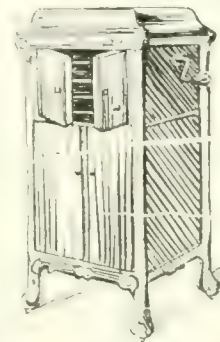
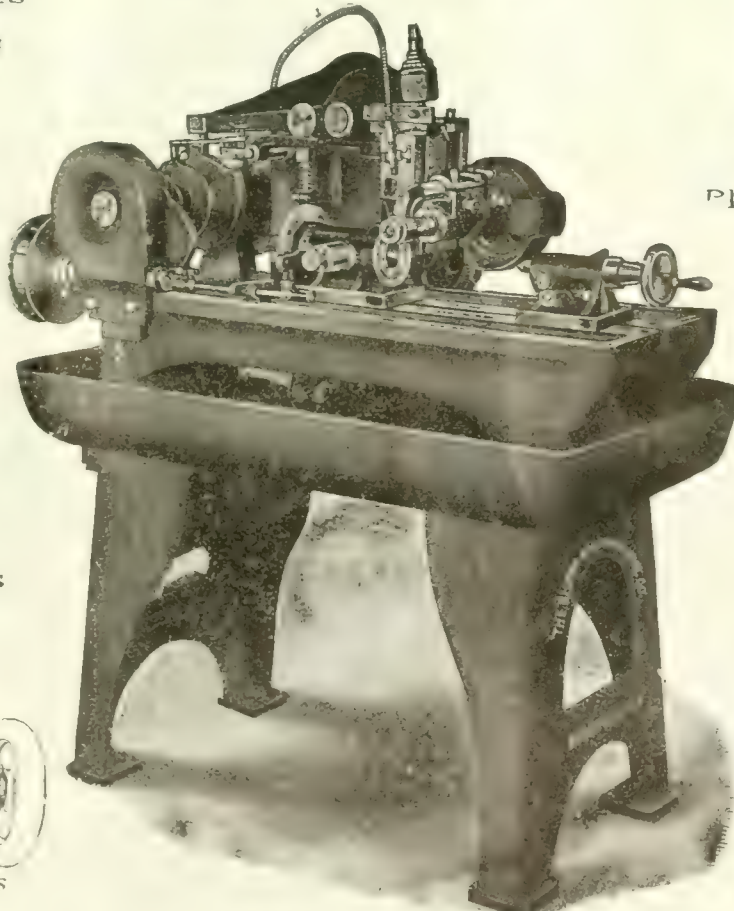
Gears



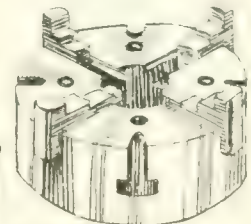
Speedometers



Automobiles



Phonographs



Chucks



Motorcycles

BILTON MACHINE TOOL COMPANY

Housatonic Avenue, BRIDGEPORT, CONN.

If interested tear out this page and place with letters to be answered.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garhart, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Van. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRANES, OVERHEAD, HAND AND ELECTRIC
Volta Manufacturing Co., Welland, Ont.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville
Williams & Wilson, Ltd., Montreal, Que.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Que.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville
Williams & Wilson, Ltd., Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Foundry & Forgings Ltd., Welland
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
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Can. Link-Belt Co., Toronto.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHERS
Elec. Steel & Metals, Welland, Ont.

CUPOLAS
Can. Blower & Forge Co., Kitchener.
Northern Crane Works, Walkerville.

CURB PUMPS FOR OIL, GASOLINE
Rouse Co. Ltd., S. F., Toronto, Ont.

CURRENT TRANSFORMERS
Volta Manufacturing Co., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTERS, BOLT
See Bolt Cutters.

CUTTERS, GEARS
Brown & Sharpe Mfg. Co., Providence, R.I.
Jennett & Co. Inc., Rock Island, Que.
Fellows Gear Shaper Co., Springfield, Vt.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co., Toronto.

CUTTER HEADS
Oliver Machinery Co., Grand Rapids, Mich.

CUTTERS, PIPE (See Pipe Cutters)

CUTTERS, MILLING
Recker Milling Mach. Co., Boston, Mass.
Baker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.

CUTTERS, PIPE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliot & Whitehall Mach. & Tool Co., Galt, Ont.

CUTTERS, FLUE
Foss Mch. & S'ply Co., G. F., Montreal
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.

CUTTERS, PIPE
Pratt & Whitney Co., Dundas, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Whitman & Barnell Mfg. Co., Akron, O.

CUTTER RELIEVING MACHINES
Can. Link-Belt Co., Toronto, Ont.

CUTTING-OFF MACHINES
Armstrong Bros., Tool Co., Chicago.

CUTTING-OFF MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Ltd., Montreal

CUTTING-OFF MACHINES
Foss Mch. & S'ply Co., G. F., Montreal
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.

Harburt, Rogers Machy. Co., South Sudbury, Mass.
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Dowson Co. Ltd., S. F., Toronto, Ont.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinchley Machine Co., Hinchley, Ill.
Kelley Reamer Co., Cleveland, O.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Truening Tool Co., Detroit.
Williams & Wilson, Limited, Montreal.

DIAMONDS, CARBON AND BORTZ
Wheel Truening Tool Co., Detroit

DIAMONDS, BLACK AND ROUGH
Joyce-Koebel Co., Inc., New York.
Wheel Truening Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIES, BRASS PRINTING, EMBOS-ING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co., of Canada, Galt.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Baker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mch. & S'ply Co., G. F., Montreal.
Gardner, Robt. & Son, Montreal.

DIES AND DIE STOCKS
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Marshall, Son & Bunney, Toronto.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

DIES AND DIE STOCKS
National Acme Co., Cleveland, Ohio.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

DIES, THREADING
Butterfield & Co. Inc., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Recker Milling Machine Co., Boston
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Canada, Galt, Ont.

DIES, SELF-OPENING
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIES, SELF-OPENING
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIES, SELF-OPENING
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIES, SELF-OPENING
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIES, SELF-OPENING
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIES, SELF-OPENING
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

DIE FILING MACHINES
Oliver Mach. Co., Grand Rapids, Mich.

DIE STEEL, HOT AND COLD WORK
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
Firth & Sons, Thos., Montreal, Que.
Kaiser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Butterfield & Co. Inc., Rock Island, Que.
Wells Bros. Co. of Can., Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., of Can., Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Can. Desmond-Stephan Mfg. Co., Hamilton
Wheel Truening Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener.
Canada Machinery Corp., Galt, Ont.
Foss Mch. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
U. S. Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Kaiser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mch. & S'ply Co., G. F., Montreal.
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefler Mfg. Co., Freeport, Ill.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES, RADIAL AND TURRET
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal.
Garlock-Walker Mach. Co., Toronto.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Mach. Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp., Galt, Ont.

Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Mach. Co., Toronto, Ont.
Hoefler Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill.
Niles-Bement-Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Hoefler Mfg. Co., Freeport, Ill.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros, Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co. Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll.
Morse Twist Drill & Machine Co., New Bedford, Mass.

DRILLS, CENTRE
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co. Inc., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll.
Morse Twist Drill & Machine Co., New Bedford, Mass.

DRILLS, BLACKSMITH AND BIT STOCK
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, ELECTRIC, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Baker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati.
Geo. F. Foss Mch. & S'ply Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.

DRILLS, HIGH SPEED TWIST
W. F. & John Barnes Co., Rockford, Ill.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Taylor J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, OIL TUBE
Butterfield & Co. Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.

CLEVELAND HOSE SPECIALTIES

Bowes Automatic Air Hose Couplings

Standard Equipment Everywhere

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes $\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch.
STYLE I.F. is an Inside Thread Female Pipe End. Made in sizes $\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch.

STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

STYLE O.M. is an Inside Thread Male Pipe End. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in. The Male and Female Ends of Bowes Couplings interchange in sizes $\frac{3}{8}$ -in. to $\frac{3}{4}$ -in. Sizes 1-in. and $1\frac{1}{4}$ -in. interchange. The $1\frac{1}{2}$ -in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected. They are absolutely air-tight under all pressures. They quickly pay for themselves by stopping costly leaks. They interchange in sizes most commonly used. They have no loose parts to be mislaid or lost. They are made of brass and will not rust. The U-shaped Gasket interchanges in couplings $\frac{1}{4}$ -inch to 1-in.

Write for Bulletin 38 illustrating Cleco Hose Fittings, Couplings, Valves, etc.

IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Coupling and stop costly leaks.

Write for Bulletin 34A, 41 and 43.

CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 84 Chestnut St., TORONTO
 A. R. WILLIAMS MACHINERY CO., TORONTO, 337 Craig St. W., MONTREAL. WILLIAMS & WILSON, MONTREAL

The Cleco Never Slip Hose Clamp

Made in same sizes as Bowes Couplings

The adjoining cut of Cleco Never Slip Hose Clamp shows the "Flanges" which engage the grooves provided in all hose ends of Bowes Couplings. The "Model Hose Clamp" illustrated shows correct style of "Flanges" and how to use and properly connect the hose.



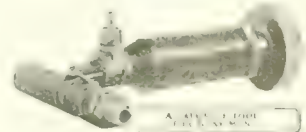
CLECO GROOVED HOSE NIPPLE



Grooved Nipples are attached to hose ends by wire clamp. The wire clamp lies in the groove of the nipple and the hose end is pulled tight.

WIRE CLAMP TOOL

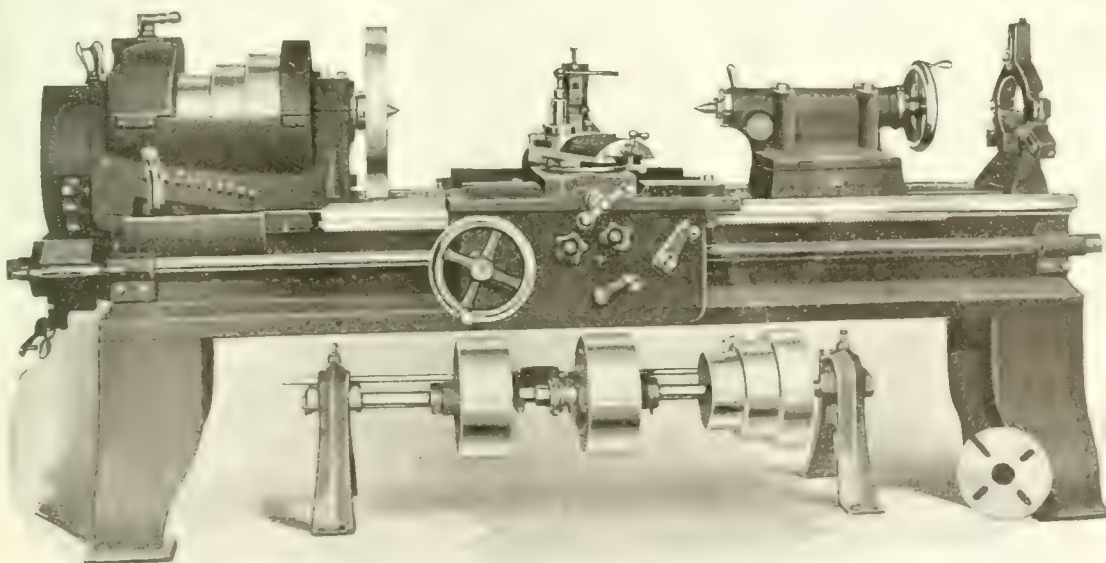
To apply Wire Clamp to Grooved Hose Nipples you need the Wire Clamp Tool. Illustrated is a hand-operated tool at moderate cost which we carry in stock for immediate delivery. In Stock:



Use Annealed Wire No. 14

Cutting and Chipping Hammers, Four-piston Air Drills, Corner Irons, Emery Grinders, Sand Rammers, Holder On's, etc.

The "RAE" 18-inch Quick Change Double Back Geared Lathe



New Type of Webbed Headstock Insures Great Strength and Rigidity Under All Conditions

Users of this lathe will find it one of the most accurate and strongest on the market.

An investment in a "Rae" will pay you big dividends in quality of work and long, efficient service.

May we send full specifications?

Ask your dealer. If he cannot supply you, write us.

**Rae
Machine
Tool
Works**

Hamilton
Canada

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Can-
ada, Toronto.

Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Mach. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.

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Cleveland Pneumatic Tool Co., Toronto.
The Foss Mch. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

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Butterfield & Co., Inc., Red Island, Que.
Cleveland Twist Drill Co., Cleveland.
The Foss Mch. & Supply Co., Montreal.
Morrow Screw & Nut Co., J., Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Can., Walkerville.

DRINKING FOUNTAINS, SANITARY
Puro Sanitary Drinking Fountain Co.,
Haydenville, Mass.

DRIVES, CHAIN
See Belting, Chain.

DRIVING TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

DRY CLEANING SYSTEM
Bowers Co., Ltd., S. F., Toronto, Ont.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
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DRUM CONTROLS
Volta Manufacturing Co., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
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Lancashire Dynamo & Motor Co., Ltd.,
Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELECTRICAL SUPPLIES
Can. General Electric Co., Toronto, Ont.

ELECTRIC FURNACES
Volta Manufacturing Co., Welland, Ont.

ELECTRIC FURNACE REGULATORS,
WINCHES, ROOF COOLERS AND
ELECTRODE HOLDERS

Volta Manufacturing Co., Welland, Ont.

ELECTRICAL RESISTANCE MA-
TERIALS, NICHROME, KROMORE,
CHROMAX, CLIMAX, NICKEL,
SILVER, ADVANCE.

Can. Driver-Harris Co., Walkerville, Ont.

ELECTRIC HOISTS, STATIONARY
AND MONO RAIL

Volta Manufacturing Co., Welland, Ont.

ELECTRIC MOTORS
Volta Manufacturing Co., Welland, Ont.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.

Canada Wire & Iron Goods Co., Hamilton

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.

Curtiss Pneumatic Machy. Co., St. Louis.
Williams & Wilson, Ltd., Montreal, Que.

ELEVATING AND CONVEYING
MACHINERY

Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Ni-
agara Falls, Ont.

Williams & Wilson, Ltd., Montreal, Que.

EMBOSSING PRESSES
Oliver Machinery Co., Grand Rapids, Mich.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Brantford Emery Wheel Co., Brantford,
Canada.

The Foss Mch. & Supply Co., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Truing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll

ENGINEERS—INDUSTRIAL
CLEANING (Free Consultation)
Oakley Chemical Co., New York, N.Y.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manches-
ter, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND
VERTICAL

Johnson Mach. Co., Carlyle, Manches-
ter, Conn.

A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Sherbrooke, Que.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch, Gananoque, Ont.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Williams & Wilson, Ltd., Montreal, Que.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Wel-
land, Ont.

EYE PROTECTORS
Standard Optical Co., Geneva, N.Y.

Strong, Kennard & Nutt Co., Cleveland.
Wilson & Co., Inc., T. A., Reading, Pa.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Rain Machine Co., Bridgeport, Conn.

Can. Blower & Forge Co., Kitchener, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.

Williams & Wilson, Ltd., Montreal, Que.

FENCE, IRON AND FACTORY
Can. Wire & Iron Goods, Hamilton, Ont.

Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES
Aikenhead Hardware Co., Toronto, Ont.

Adkins & Co., Wm., Sheffield, Eng.

Ingersoll File Co., Ltd., Ingersoll, Ont.

Morrow Screw & Nut Co., J., Ingersoll, Ont.

Marshall, Son & Bunney, Toronto, Ont.

Nicholson File Co., Port Hope, Ont.

Rice Lewis & Son, Toronto, Ont.

Simonds Mfg. Co., Fitchburg, Mass.

Whitman & Barnes Mfg. Co., Akron, O.

Wilkinson & Kompass, Hamilton, Ont.

FILTERING AND CIRCULATING
SYSTEMS FOR LUBRICATING OIL

Bowers Co., Ltd., S. F., Toronto, Ont.

Can. Wire & Iron Goods, Hamilton, Ont.

FINISHING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland.

FIRE EXTINGUISHERS
Strong, Kennard & Nutt Co., Cleveland, O.

FIXTURES
Brown Engineering Corp., Toronto, Ont.

Elliott & Whitehall Mach. & Tool Co.,
Galt, Ont.

Illinois Tool Works, Chicago, Ill.
Morton Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLAT SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FLOTATION MACHINERY
Elec. Steel & Metals, Welland, Ont.

FUMES
William Hamilton Co., Peterboro, Ont.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.

Can. Blower & Forge Co., Kitchener.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.

FORGINGS, STEEL AND IRON
Blanche Co., L. C., New York City.

Can. Found. & Forgings, Ltd., Welland.
Nova Scotia Steel & Coal Co., New
Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE
AND LOCOMOTIVE FORGING
AND WELDING

Blanche Co., L. C., New York City.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamp Co., Walkerville.
Steel Co. of Canada, Ltd., St. Catharines.
Victoria Foundry Co., Ottawa.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas, Ont.

Bliss, E. W., Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Ont.

Canada Machinery Corp., Galt, Ont.

Garlock-Walker Machy. Co., Toronto, Ont.

National Machy. Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

FORGINGS, SPECIAL
Armstrong-Whitworth of Can., Montreal.

Blanche Co., L. C., New York City.

Can. Found. & Forgings, Ltd., Welland.

Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Brown & Sharpe Mfg. Co., Providence, R.I.

FOUNTAINS, DRINKING
Puro Sanitary Drinking Fountain Co.,
Haydenville, Mass.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Montreal.

FUEL OIL SYSTEMS
Bowers Co., Ltd., S. F., Toronto, Ont.

Gilbert & Barker Mfg. Co., Springfield.

FURNACES, ANNEALING, CASE
HARDENING AND TEMPERING

Bellevue Furnace Co., Detroit, Mich.

Brown & Sharpe Mfg. Co., Providence, R.I.

Chicago Flexible Shaft Co., Chicago, Ill.

Gilbert & Barker Mfg. Co., Springfield.

Mechanical Eng'g Co., Three Rivers, Q.

Standard Fuel Eng'g Co., Detroit, Mich.

Williams & Wilson, Ltd., Montreal, Que.

FURNACES, BLAST
Bellevue Industrial Furnace Co., Detroit.

Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield.

FUSE BOXES, STEEL
Dom. Forge & Stamp Co., Walkerville.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowers Co., Ltd., S. F., Toronto, Ont.

GASOLINE TANKS
Bowers Co., Ltd., S. F., Toronto, Ont.

GASOLINE PUMPS, SELF-
MEASURING

Bowers Co., Ltd., S. F., Toronto, Ont.

Brown & Sharpe Mfg. Co., Providence, R.I.

GAUGES
Elliott & Whitehall Mach. & Tool Co.,
Galt, Ont.

GAUGERS, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN,
DRAFT

Taylor Instrument Co., Rochester, N.Y.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, MANUFACTURERS,
LIMIT, THREAD

Greenfield Tap & Die Corp., Greenfield.

Wells Bros. of Can., Galt, Ont.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.

Canadian Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Garvin Machine Co., New York.

Illinois Tool Works, Chicago, Ill.

C. E. Johanson, Inc., Toronto, Ont.

Morse Twist Drill & Machine Co., New
Bedford.

Peck, Stow & Wilcox Co., Southington,
Conn.

Pratt & Whitney Co., Hartford, Conn.

Taylor, J. A. M., 518 Stair Bldg., Toronto

Toronto Tool Works, Toronto, Ont.

Wells Brothers Co. of Canada, Galt, Ont.

Worth Engineering Co., Toronto, Ont.

Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR SHAPERS AND CUTTERS
Fellows Gear & Shaper Co., Springfield, V.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.

Fellows Gear & Shaper Co., Springfield, V.

Garlock-Walker Machy. Co., Toronto, Ont.

D. E. Whitton Machine Co., New Lon-
don, Conn.

A. R. Williams Machy. Co., Toronto.

Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES,
BEVEL

Bridgeford Mach. Tool Wks, Rochester

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CHAIN
Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING
Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE,
WORM

Barter & Co., Ltd., J. R., Montreal.

Can. Link-Belt Co., Toronto, Ont.

Dominion Bridge Co., Montreal, Que.

Dom. Foundries & Steel, Hamilton, Ont.

Gardner, Robt., & Son, Montreal.

Grant Gear Works, Boston, Mass.

Hamilton Gear & Machine Co., Toronto.

Hull Iron & Steel Found., Ltd., Hull, Q.

Illinois Tool Works, Chicago, Ill.

Jones & Glasco, Montreal.

Wm. Kennedy & Sons, Ltd., Owen
Sound, Ont.

Philadelphia Gear Works, Philadelphia.

Victoria Foundry Co., Ottawa.

Wilson & Co., J. O., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal.

Grant Gear Works, Boston, Mass.

Hamilton Gear & Machine Co., Toronto.

Jones & Glasco, Montreal.

Philadelphia Gear Works, Philadelphia.

A. R. Williams Machy. Co., Toronto.

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Fellows Gear & Shaper Co., Springfield, V.

GEARS, SPRING
Morse Chain Co., Ithaca, New York.

GEARS, SPUN, BENCH, SPIRAL
Brown & Sharpe Mfg. Co., Providence, R.I.

GEARS, SILENT CHAIN GENERA-
TORS, STEAM TURBO

Can. General Electric Co., Toronto, Ont.

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Can. General Electric Co., Toronto, Ont.

GENERATORS, MOTOR
A. R. Williams Machy. Co., Toronto.

Williams & Wilson, Ltd., Montreal.

MacGovern & Co., Montreal.

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Brown's Copper & Brass Rolling Mills,
New Toronto, Ont.

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WATERPROOF, ETC.

Strong, Kennard & Nutt Co., Cleveland.

GLUE HEATERS
Oliver Machinery Co., Grand Rapids, Mich.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland.

Wilson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto.

Rice Lewis & Son, Toronto.

GOGGLES
Consolidated Optical Co., Toronto.

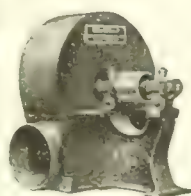
Standard Optical Co., Geneva, N.Y.

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Wilson & Co., Inc., T. A., Reading, Pa.

Welding & Supplies Co., Montreal.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.



Planing Mill Fan



No. 2 Vacuum Cleaner

Sturtevant (TRADE MARK) SYSTEMS



Autoforce Ventilator



Steam Turbine



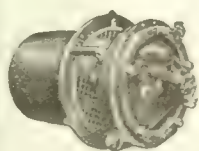
Electric Propeller Fan



Low Pressure Blower



Volume Blower and Exhauster



Turbo-Blower

AIR SPECIALISTS!

The name Sturtevant symbolizes the best engineering practice in design and construction of air-moving and power apparatus, and is the outcome of over 60 years of "knowing how."

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Quality, efficiency and reliability have combined to mould the ideal upon which the largest staff of fan engineering experts in the country have developed the "built in" supremacy of Sturtevant products comprising Fans, Blowers, Exhausters, Heaters, Ventilators, Air Washers, Fuel Economizers, Vacuum Cleaners, Steam Engines, Steam Turbines, Electric Motors, Generating Sets.

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B. F. Sturtevant Company of Canada, Ltd.

Factory and General Office: Galt, Ont.

Montreal

Toronto

Winnipeg



Medium Pressure Blower



High Pressure Blower



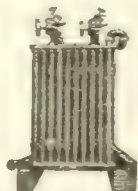
Gasoline Generating Set



Direct Current Motor



Type H Air Washer

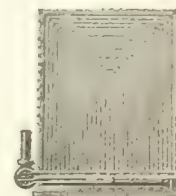


Fuel Economizers

Sturtevant (TRADE MARK) PRODUCTS



VS-7 Steam Engine



Heater

If interested tear out this page and place with letters to be answered.

Cleveland Pneumatic Tool Co., Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Monse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Elec. Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal.

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Lancaster Tool Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, DIE AND CHASER

Lancaster Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK

Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton.
Garvin Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
United States Elec. Tool Co., Cincinnati.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, CYLINDER, INTERNAL

Brown & Sharpe Mfg. Co., Providence, R.I.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Williams & Wilson, Ltd., Montreal.

GRINDERS, PORTABLE, ELECTRIC,

HAND, TOOL POST, FLOOR
AND BENCH

Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Grant Mfg. & Mach. Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
United States Elec. Tool Co., Cincinnati.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, MANUFACTURING

Universal Grinding Mach. Co., Fitchburg, Mass.

GRINDERS, HOLE, HOLE AND

FACE AND DEEP HOLE
Bryant Chucking Grinder Co., Springfield, Vermont.

GRINDERS, PLAIN CYLINDRICAL

Fitchburg Grinding Mach. Co., Fitchburg, Mass.

GRINDERS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co., Toronto.
Garlock-Walker Machinery Co., Toronto.
Heald Machine Co., Worcester, Mass.
Independent Pneumatic Tool Co., Chicago.
MacGorm & Co., Montreal, Que.

GRINDERS, PROFILE

Cleveland Milling Machine Co., Cleveland.

GRINDERS, ROTARY SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER

Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blount, & Co., J. G., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Machine Co., Hamilton, Ont.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Canada, Galt, Ont.

GRINDERS, UNIVERSAL, PLAIN

Modern Tool Co., Erie, Pa.
Williams & Wilson, Ltd., Montreal.

GRINDERS, VERTICAL, SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Osholt Machine Co., Madison, Wis.
Williams & Wilson, Ltd., Montreal.

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Can. Fairbanks-Morse Co., Montreal.
Cincinnati Elec. Tool Co., Cincinnati, O.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner & Son, Robt., Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford, Ont.
LeBlond Mch. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York, N.Y.

Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Ltd., Montreal.

GRINDING MACHINES, CAR WHEEL, CUTTER, CYLINDRICAL, CRANKSHAFT

Brown & Sharpe Mfg. Co., Providence, R.I.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto.
Brantford Emery Wheel Co., Brantford, Ont.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Norton Co., Worcester, Mass.

GUARDS, WINDOW AND MACHINE

Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton.
Dennis Wire & Iron Works, London, Ont.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland.

HANDLES, BALANCE, CRANK AND MACHINE

Williams & Co., J. H., Brooklyn, N.Y.

GUTTERS AND SKYLIGHTS

H. H. Robertson, Ltd., Sarnia, Ont.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Baker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Ford-Smith Machine Co., Hamilton, Ont.
Karsner-Elliott & Co., Ltd., Montreal.
Marshall, Son & Bunnery, Toronto.
Norton, Ralph B., Agent, Montreal.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Pewees, Ltd., Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Fitchburg, Mass.
Simonds Mfg. Co., Fitchburg, Mass.
S. S. Starrett Co., Attleboro, Mass.
Standard Machy. & Supplies, Montreal.
Victor Saw Works, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton.
Williams & Wilson, Ltd., Montreal.

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Aikenhead Hardware Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Fitchburg, Mass.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal.

HACK SAWS, POWER

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Foss Mch'y. & S'ply. Co., G. F., Montreal.
Ford-Smith Machine Co., Hamilton.
Peelers Machine Co., Racine, Wis.
Racine Tool & Mach. Co., Racine, Wis.
Starrett Co., L. S., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.

HAMMERS, HATCHETS

Whitman & Barnes Co., St. Catharines.

HAMMERS (DROP), MOTOR AND BELT DRIVEN

Beaudry & Co., Boston, Mass.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton.
Can. Billings & Spencer, Galt, Welland.
Canada Machinery Corp., Galt, Welland.
High Speed Hammer Co., Rochester, N.Y.
Jasine & Co., E. H., Hesper, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Ltd., Montreal.

HAMMERS, HELVE POWER

Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

HAMMERS, MARKING

Mathews & Co., Jas. H., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE

Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston, Mass.

HAMMERS, STEAM

Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

HAND PLANERS

Oliver Mch'y. Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS

Graton & Knight Mfg. Co., Montreal.

HANGERS

Brown & Sharpe Mfg. Co., Providence, R.I.

HANGERS, SHAFT

Victor Steel Corp., Sault Ste. Marie.
Can. General Electric Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Can. S. K. F. Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Jones & Glasco, Montreal.
Standard Pressed Steel Co., Philadelphia.
Williams & Wilson, Limited, Montreal.

HARDNESS TESTING INSTRUMENTS

Shore Instrument & Mfg. Co., New York

HEAD, AUXILIARY

Hofer Mfg. Co., Freeport, Ill.

HEATING AND VENTILATING ENGINEERS

Can. Blower & Forge Co., Kitchener, Ont.

HEAT TREATMENT OF STEEL

Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING

Shore Instrument & Mfg. Co., New York

HELMETS, SANDBLAST, AMMONIA

Strong, Kennard & Nutt Co., Cleveland.

HIGH SPEED STEEL

See Steel.

HINGE MACHINERY

Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES

London Bolt & Hinge Wks., London, Ont.

HOBS

Greenfield Tap & Die Co., Greenfield, Mass.
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Wells Bros. of Canada, Galt, Ont.

HOISTS, AIR

Can. Ingersoll-Rand Co., Ltd., Sherbrooke.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTS, CHAIN AND PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Ford Chain Block & Mfg., Philadelphia.
Independent Pneumatic Tool Co., Chicago.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal.

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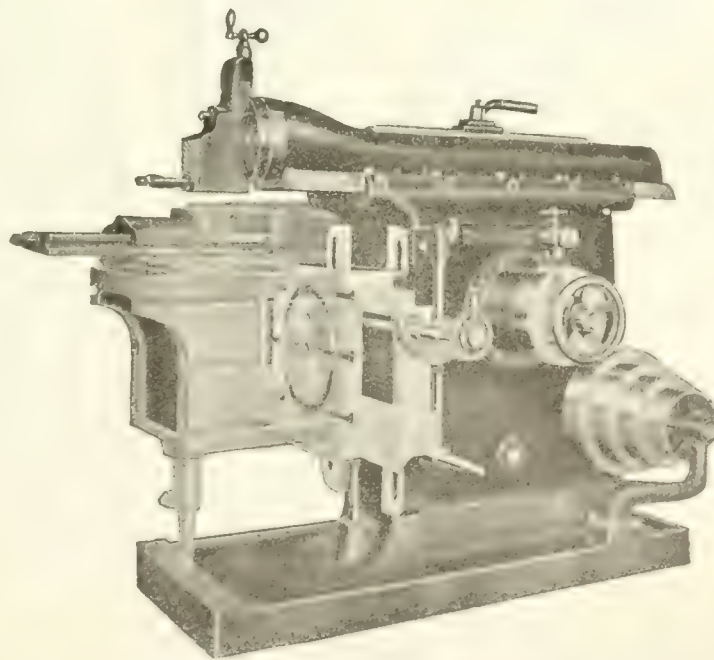
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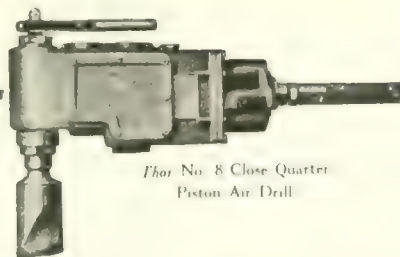
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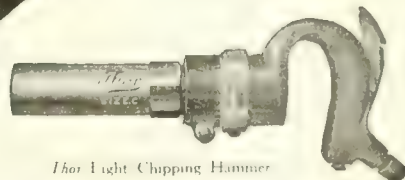
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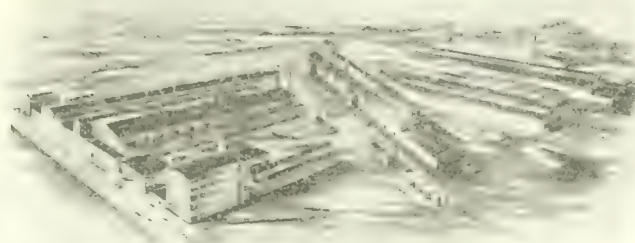
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Landis Machine Co., Waynesboro, Pa.
McDougal Co., R., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
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Gardner & Son, Ryb., Montreal.
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Garvin Machine Co., New YorkMorton Mfg. Co., Muskegon Heights, Mich.
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Cleveland P'matic Tool Co., Can. Toronto.
Curtis Pneumatic Machy. Co., St. Louis.
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Stoll Co., D. H., Buffalo, N.Y.
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Consolidated Press Co., Hastings, Mich.
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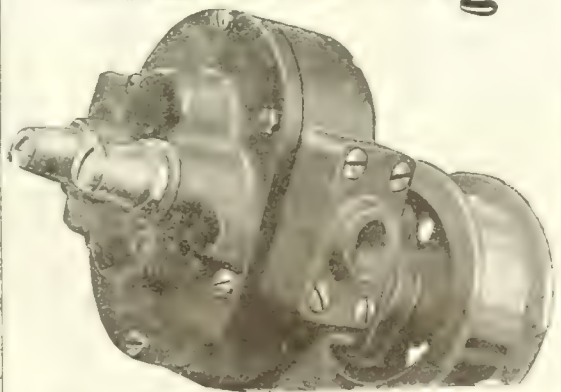
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John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton.
Can. Blower & Forge Co., Kitchener.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy Co., Ltd., Toronto.
Long & Allstetter, Hamilton, Ohio.
Wickes Bros. Saginaw, Mich.
A. B. Jardine & Co., Hespeler, Ont.
National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. D. Stoll Co., Inc., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
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SHEARS, ROTARY

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SHEARS, PNEUMATIC

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SHEETS, NICKEL, RESIST, ALLOY

Can. Driver-Harris Co., Ltd., Walkerville.

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Quickwork Co., St. Mary's, Ohio.

SHEARS, SPLITTING

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SHEARS, IRREGULAR AND CIRCLE CUTTING

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SHEARS, SERPENTINE

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D. H. Stoll Co., Inc., Buffalo, N.Y.

SHEARS, SQUARING

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Brown, Boggs & Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, C.
D. H. Stoll Co., Inc., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal.

SHEETS, CRUCIBLE, CAST

Kayser Ellison & Co., Ltd., Montreal.
Ralph B. Norton, Agent, Montreal.

SHEET METAL WORKING MACHINERY

D. H. Stoll Co., Inc., Buffalo, N.Y.

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Dennis Wire & Iron Works, London.

SHIPYARD MACHINERY, SHOP FURNITURE

Dennis Wire & Iron Works, London.

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J. H. Williams & Co., Brooklyn, N.Y.**SILENT CHAINS**

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Jones & Glasco, Montreal.

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Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLEDGES, CAST IRON

Katie Foundry, Galt, Ont.

SLINGS, CHAINS

Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS

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Garvin Machine Co., New York.
National Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.

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MacKinnon Steel Co., Sherbrooke, Que.

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Kesteven Mfg. Co., Buffalo, N.Y.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Whitman & Barnes Mfg. Co., Akron, O.

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Canada Metal Co., Ltd., Toronto, Ont.
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Ford-Smith Machine Co., Hamilton, Ont.
Garlock Walker Machinery Co., Toronto.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Garvin Machine Co., New York.
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John H. Hall & Sons, Brantford.
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Katie Foundry, Galt, Ont.
National Acme Co., Cleveland, Ohio.
Marten Machine Co., Hamilton, Ont.
Rae Brothers, Hamilton, Ont.
Scoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Whism & Co., J. C. Belleville, Ont.
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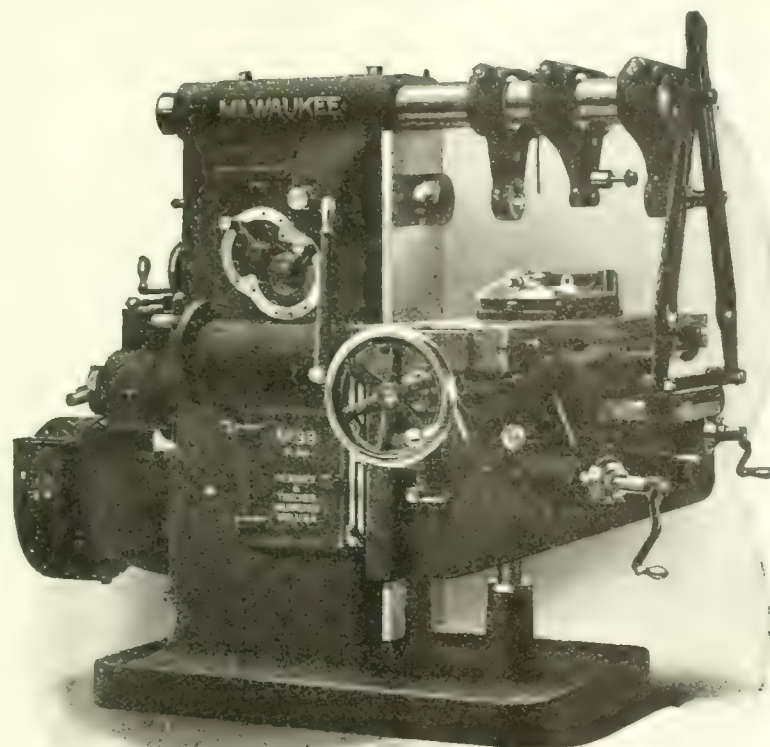
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Morse Chain Co., Ithaca, N.Y.
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Landis Machine Co., Weynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
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Williams & Wilson, Ltd., Montreal, Que.

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Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glasco, Montreal.
Kennedy & Sons, Wm. Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
Wilson & Co., J. C., Belleville, Ont.
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
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Can. Drawn Steel Co., Hamilton, Ont.
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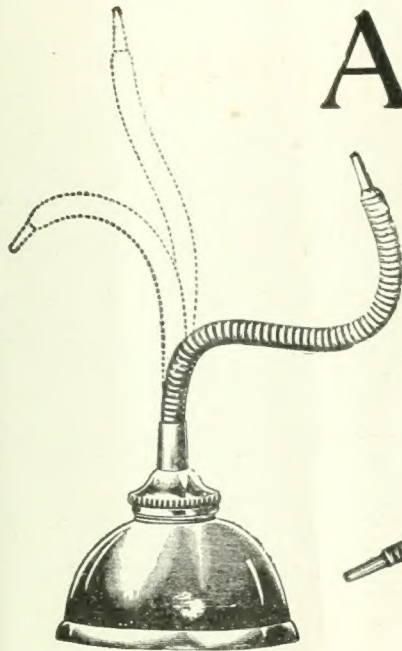
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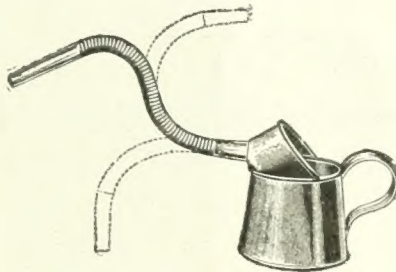
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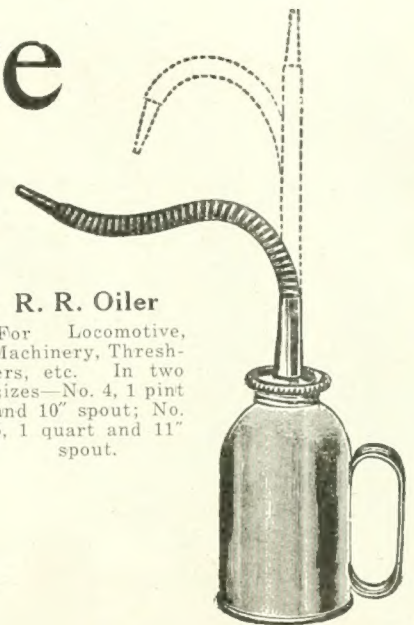
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A 7" spout to each.



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For Automobile and all types of machinery. Fitted with
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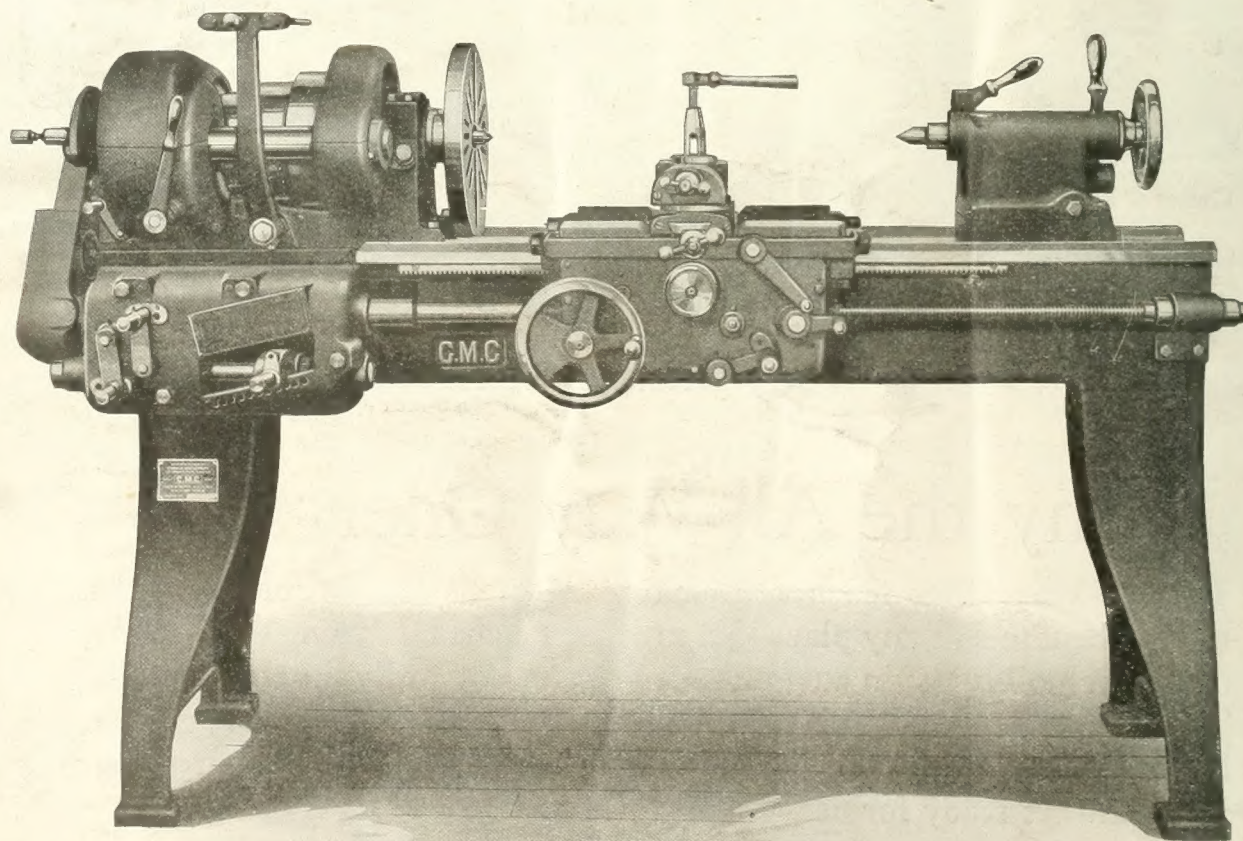
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